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FURUNO

INSTALLATION MANUAL

RADAR PLOTTER SOUNDER

MODEL FRS-1000A/FRS-1000B/FRS-1000C

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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© FURUNO ELECTRIC CO., LTD.

9-52, Ashihara-cho,
Nishinomiya, Japan

Telephone: 0798-65-2111
Telefax: 0798-65-4200

•Your Local Agent/Dealer

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(YOSH)

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IME34460M10

⚠ SAFETY INSTRUCTIONS

⚠ WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m^2 exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible—Ask your FURUNO representative or dealer to provide this feature.

Model	Distance to 100 W/m^2 point	Distance to 10 W/m^2 point
FRS-1000A	Nil	1.3 m
FRS-1000B	Worst case 0.2 m	Worst case 3.0 m
FRS-1000C	Nil	2.5 m

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Construct a suitable service platform from which to install the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Be sure no water leaks in at the transducer installation site.

Water leakage can sink the vessel. Also confirm that the transducer will not loosen by ship's vibration. The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

Turn off the power at the mains switchboard before beginning the installation.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or equipment damage.

⚠ WARNING

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

Use only the specified power cable.

Fire or equipment damage can result if a different cable is used.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard compass	**Steering compass**
Display unit	1.1 m	0.8 m
Antenna unit	1.1 m	0.75 m
Processor unit	0.9 m	0.7 m

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Standard Supply

Name	Type	Code No.	Qty	Remarks	
GPS Antenna Unit	GPA-016	–	1	GPS only	
	GPA-018S	–		For DGPS, 1.2 m whip antenna required	
	GPA-019S	–		For DGPS, whip antenna not required	
Radar Antenna Unit	RSB-0071-057	–		For RS-1000A	
	XN10A-RSB-0070-064	–	1	24 rpm	For FRS-1000B
	XN10A-RSB-0073-064	–		48 rpm	
	XN12A-RSB-0070-059	–	1	24 rpm	For FRS-1000C
	XN12A-RSB-0073-059	–		48 rpm	
Display Unit	RSD-001		1	With Remote Controller RMC-010-E	
Processor Unit	RSM-001		1		
Radar Antenna Installation Materials	CP03-18401	008-503-360	1 set	FRS-1000B/FRS-1000C	
	CP03-16901	008-478-750	1 set	FRS-1000A	
	CP86-00502	006-968-490			
Installation Materials	CP86-00500	000-041-442	1 set	TNC-PS-3D-15 03S9369 (5 m) CP20-01111 Radar antenna cable: None/10/15/20/30 m CP86-00501	
	CP86-00511	000-041-443			
	CP86-00512	000-041-444			
	CP86-00513	000-041-445			
	CP86-00514	000-041-446			
	CP86-00515	000-041-447		TNC-PS-3D-15 03S9369 (5 m) CP20-01111 Radar antenna cable: None/10/15/20/30 m CP86-00501	
	CP86-00516	000-041-448			
	CP86-00517	000-041-449			
	CP86-00518	000-041-450			
	CP86-00519	000-041-451			
	CP86-00520	000-041-452		TNC-PS-3D-15 03S9369 (5 m) CP20-005551 CP20-01111 Radar antenna cable: None/10/15/20/30 m CP86-00501 Whip antenna FAW-1.2	
	CP86-00521	000-041-453			
	CP86-00522	000-041-454			
	CP86-00523	000-041-455			
	CP86-00524	000-041-456			
	CP86-00525	000-041-457		TNC-PS-3D-15 0359368 (5 m) CP20-00551 Radar antenna cable: None/10/15/20/30 m Whip antenna FAW-1.2	
	CP86-00526	000-041-458			
	CP86-00527	000-041-459			
	CP86-00528	000-041-460			
	CP86-00529	000-041-461			
	CP86-00610	000-041-465	1	02S4146, FM-C10FPD000-050	
	CP86-00620	000-041-466		02S4146, FM-C10FPD000-100	
	CP86-00630	000-041-467		02S4146, FM-C10FPD000-150	
	CP86-00640	000-041-468		02S4146, FM-C10FPD000-200	
	CP86-00650	000-041-469		02S4146, FM-C10FPD000-300	
Accessories	FP86-01100	006-968-050	1		
	FP86-01200	006-968-120	1		
Spare Parts	SP86-00401	006-968-030	1		

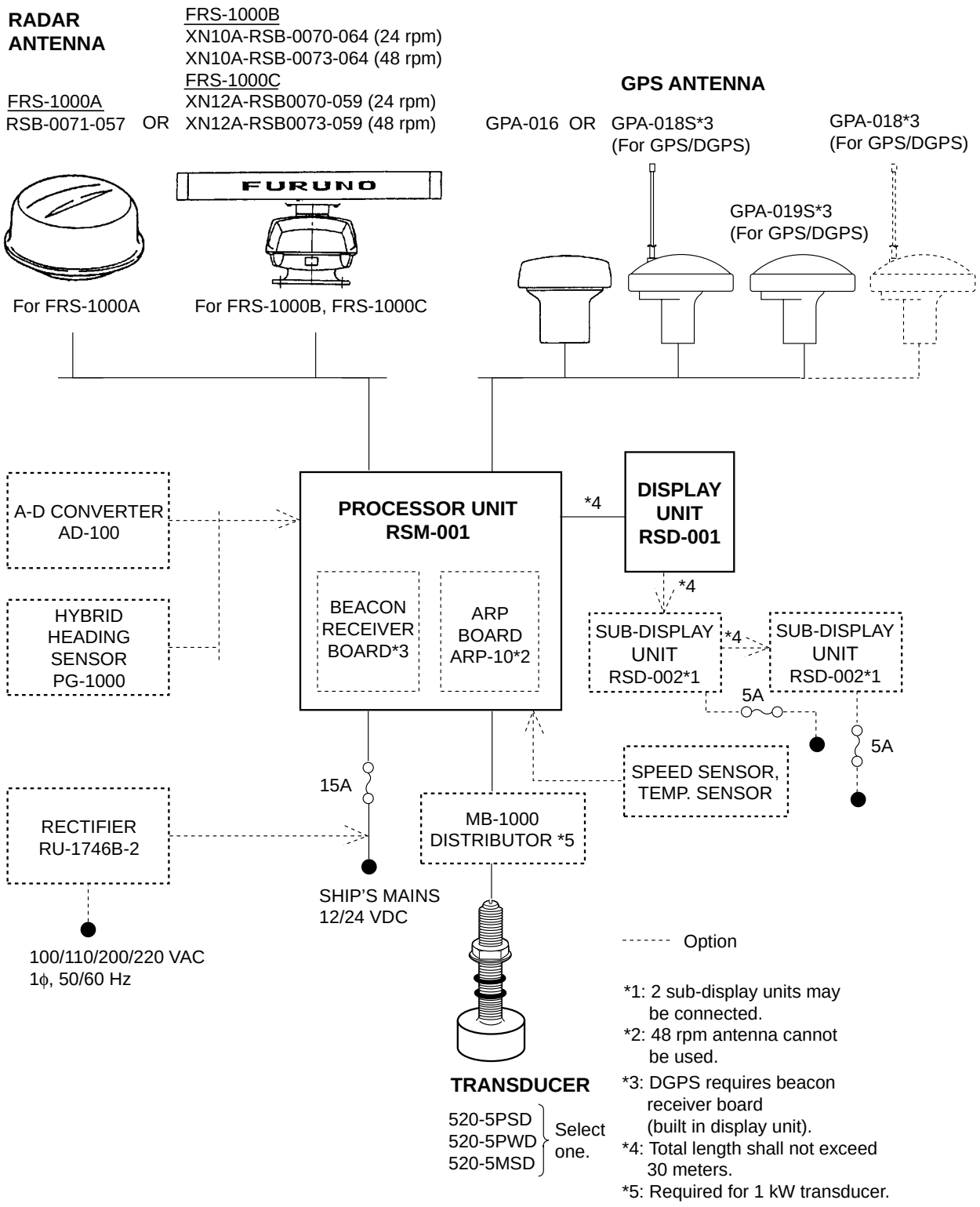
Optional Equipment

Name	Type	Code No.	Remarks
Sub-Display Unit	RSD-002	–	
Cable	MJ-A6SPF0010-100	000-131-749	
Remote Controller	RMC-010-E	006-968-080	
RAM Card	00RAM256C-001	004-321-070	
RAM Card	00RAM512C-002	004-322-230	
Toroidal Core	0P86-6	004-039-490	
Transducer	520-5PSD	000-015-125	
Transducer	520-5PWD	000-015-126	
Transducer	520-5MSD	000-015-127	
Speed/Temperature Sensor	ST-02MSB	000-137-986	
Inside Hull Kit	22S0191	000-802-598	
Rectifier	RU-1746-B	–	
Rectifier	PR-62		For RSD-002
AD Converter	AD-100	000-040-108	
NMEA Cable	22S-0021	000-109-517	
X-Band MIC	RU-8014	000-011-556	
Converter Cable Assy.	NJ-TP-3DXV-1	000-123-809	
Cable Assy.	MJ-A6SPF0009-100	000-125-236	
Right Angle Antenna Base	NO.13-QA330	000-803-239	For GPS antenna
L-type Antenna Base	NO.13-QA310	000-803-240	
Handrail Antenna Base	NO.13-RC5160	000-806-114	
Mast Mounting Kit	CP20-0111	004-365-780	For GPS antenna
Whip Antenna	FAW-1.2	000-130-046	For GPA-018S
Transducer	50/200-1T *10M*	000-015-170	
	50B-6 *10M*	000-015-042	
	50B-6G *10M*	000-015-016	
	200B-5 *10M*	000-015-027	
	200B-5S *10M*	000-015-029	
Temperature Sensor	T-02MTB	000-040-026	
	T-02MSB	000-040-040	
	T-03MSB	000-040-027	
Hybrid Heading Sensor	PG-1000	–	
Distributor	MB-1000	000-040-809	
Cable Assy.	02S4152	–	For MB-1000
	02S4146 *5M*	000-141-009	Wiring between display unit and sub-display unit (VO-VI)
	02S4146 *10M*	000-141-017	
	02S4146 *15M*	000-141-018	
	02S4146 *20M*	000-141-019	
	02S4146 *30M*	000-141-020	

Optional Equipment (con't)

Name	Type	Code No.	Remarks
Cable Assy.	FM-C10FPD001-050	–	
	FM-C10FPD001-100	–	
	FM-C10FPD001-150	–	
	FM-C10FPD001-200	–	
	FM-C10FPD001-300	–	
Beacon Receiver Kit	GR-802-10	000-041-463	
	GR-802-15	004-041-464	
ARP Board	ARP-10	000-086-852	
Antenna Cable Assy.	TNC-PS-3D-15	000-133-670	GPS antenna cable
GPS Antenna Cable Set	CP20-01700 *30M*	004-372-110	Extension of GPS antenna cable
	CP20-01710 *50M*	004-372-120	Extension of GPS antenna cable
Flush Mount Kit	OP86-9	006-968-130	For display unit
Transducer	520-5PSD	000-015-125	Select one
	520-5PWD	000-015-126	
	520-5MSD	000-015-127	
Connector Assy.	OP86-10	006-969-140	Terminator B w/VRs

SYSTEM CONFIGURATION



MOUNTING AND WIRING OF RADAR ANTENNA, GPS ANTENNA

1.1 Mounting Considerations for Radar Antenna

- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the antenna unit where there is a good all-round view rigging intercepting the scanning beam. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the width of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the antenna unit would be a much more serious obstruction; you would need to place the antenna unit well above or below it.
- It is rarely possible to place the antenna unit where a completely clear view in all direction is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.
- If there is a radio direction finder on the ship, locate its antenna clear of the antenna unit, to prevent interference to the direction finder. A separation of more than two meters is recommended.
- To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.
- A magnetic compass will be affected if placed to close to the antenna unit. Observe the compass safe distances below to prevent deviation of the magnetic compass: Standard compass, 1.10, Steering compass 0.75 m.
- Do not paint the radome (Model FRS-1000A) or radiator aperture (FRS-1000B/ FRS-1000C), to ensure proper emission of the radar waves.
- The signal cable run between the antenna and the display comes in lengths of 10 m, 15 m, 20 m and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
- Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The antenna unit must not be mounted where the temperature is more than 70°C.

1.2 Mounting Radar Antenna of FRS-1000A

Typical mounting locations

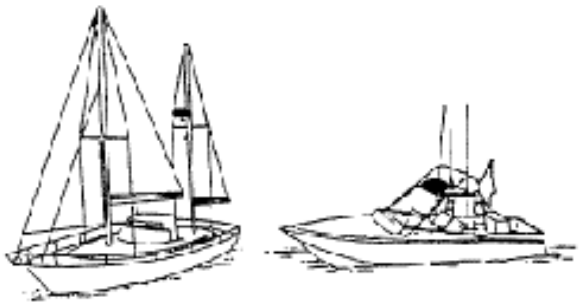


Figure 1-1 Typical mounting locations for radar antenna for FRS-1000A

The radome can be fastened to a mast of 70-125 mm diameter with the optional radome mounting bracket.

Name	Type	Code No.
Radome Mounting Bracket	OP03-92	008-445-070

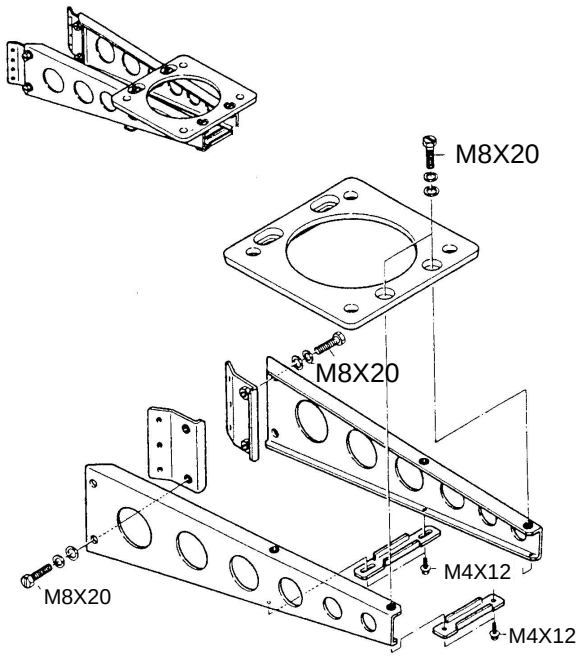


Figure 1-2 Optional mounting bracket for radome antenna

Mounting the antenna unit

1. Open the antenna unit packing box carefully.
2. Unbolt the four bolts at the base of the radome to remove the radome cover.

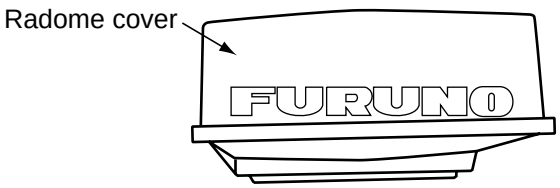


Figure 1-3 Antenna unit

The mounting surface must be parallel with the waterline and provided with five holes whose dimensions are shown in the outline drawing attached at the end of this manual.

The unit is adjusted so a target echo returned from the bow direction will be shown on the zero degree (heading line) position on the screen. When drilling holes, be sure they are parallel with the fore and aft line.

3. Prepare a platform of 5 to 10 millimeters in thickness for the antenna unit. A mounting bracket for mounting the antenna unit on a sailboat mast is optionally available. (Refer to page 1-9.) Find the cable entry on the radome base. Next, position the radome base so the cable entry faces the stern direction. This alignment must be as accurate as possible.

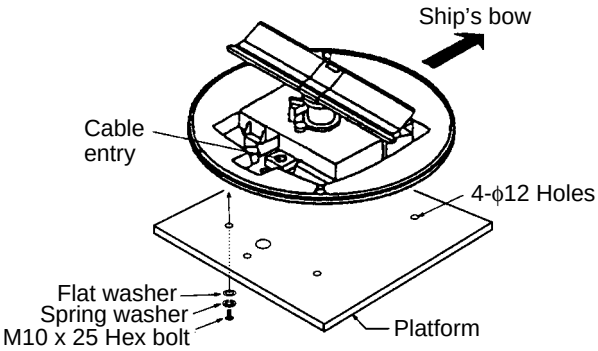


Figure 1-4 Antenna unit, cover removed

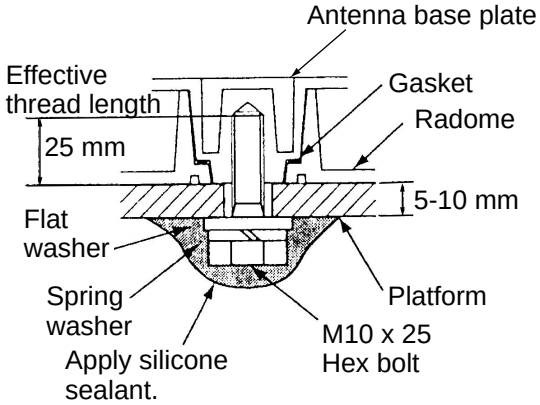


Figure 1-5 How to fasten the radome base to the mounting platform

Wiring and final preparation

4. Drill a hole of at least 20 millimeters diameter through the deck or bulkhead to run the signal cable between the antenna unit and the display unit. (To prevent electrical interference avoid running the signal cable near other electrical equipment and in parallel with power cables.) Pass the cable through the hole. Then, seal the hole with sealing compound for waterproofing.
5. Remove two shield covers in the radome.
6. Remove the cable clamping plate by unfastening four screws and removing a gasket.

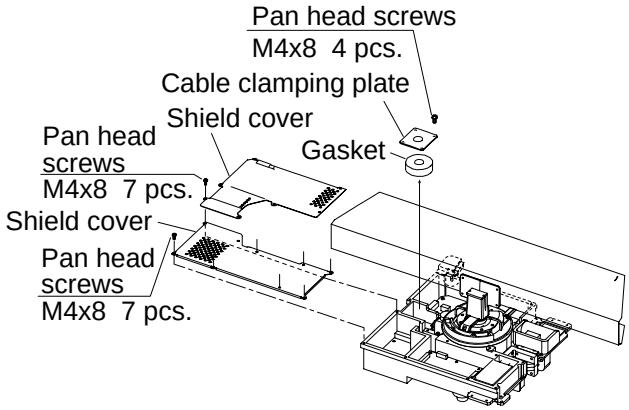


Figure 1-6 Antenna unit, inside view

7. Pass the cable through the hole at the bottom of the radome base.
8. Secure the cable with the cable clamping plate and gasket. Ground the shield and vinyl wire by one of the screws of the cable clamping plate.
9. Connect the wire to the RF unit.

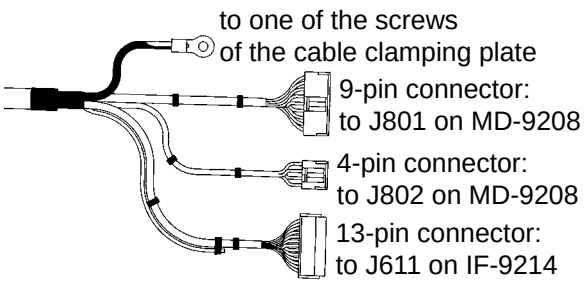


Figure 1-7 Signal cable, antenna unit side

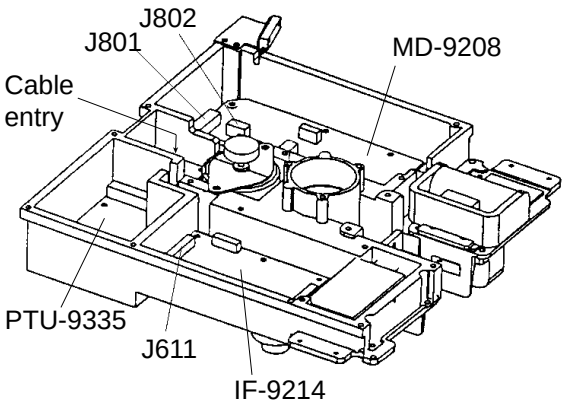


Figure 1-8 RF unit

10. Attach the EMC core supplied as shown below.

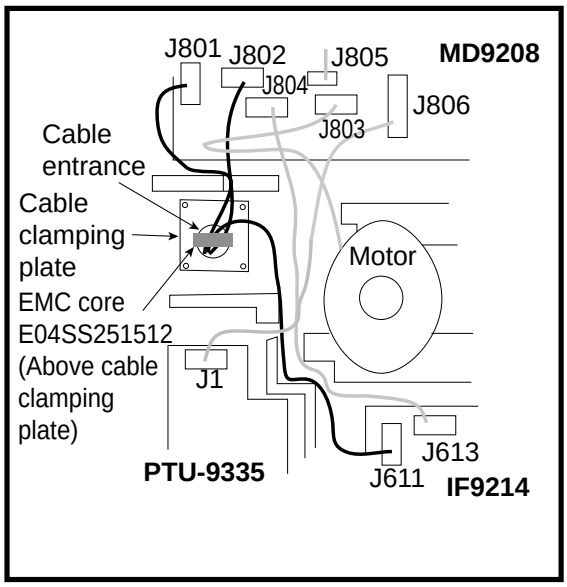


Figure 1-9 How to attach EMC core

11. Fix the shield cover. Do not pinch the cable.
12. Attach the radome cover, aligning triangle mark on radome cover with that on radome base.

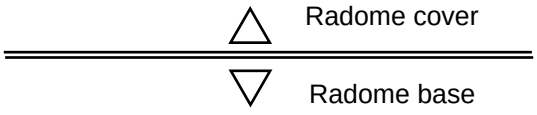


Figure 1-10 How to position the radome cover

13. Loosely fasten the radome fixing bolts. You will tighten them after confirming magnetron heater voltage.

1.3 Mounting Radar Antenna of FRS-1000B/FRS-1000C

Typical mounting location

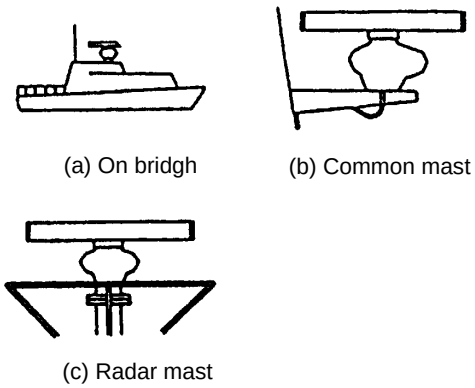


Figure 1-11 Typical mounting locations for radar antenna FRS-1000B, FRS-1000C

Fixing holes in mounting platform

Referring to the outline drawing on page D-2, drill five holes in the mounting platform: four holes of 15 mm diameter for fixing the antenna unit and one hole of 25-30 mm diameter for the signal cable.

Fastening the radiator to the radiator bracket

For your reference, antenna installation materials list appears on page A-11.

1. Remove the radiator cap from the radiator bracket.
2. Coat contacting surface between antenna radiator and radiator bracket with anticorrosive sealant as shown in Figure 1-11 (FRS-1000B) or Figure 1-12 (FRS-1000C).

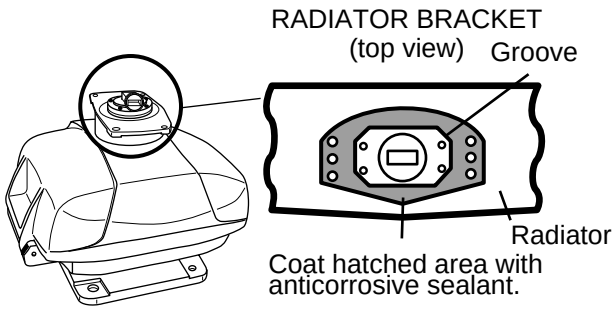


Figure 1-12 Coating radiator bracket of radar antenna for FRS-1000B with anticorrosive sealant

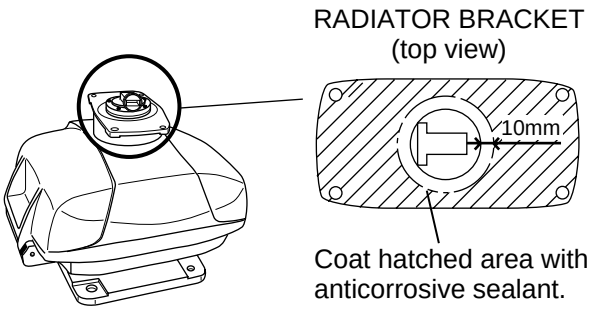


Figure 1-13 Coating radiator bracket of radar antenna for FRS-1000C with anticorrosive sealant

3. Coat threaded holes on the antenna radiator with anticorrosive sealant.
4. Grease the O-ring and set it to the radiator bracket.
5. Lay the antenna radiator on the radiator bracket.
6. Coat the radiator fixing bolts (4 pcs.) with anticorrosive sealant. Fasten the antenna radiator to the radiator bracket with the radiator fixing bolts, flat washers and spring washers.

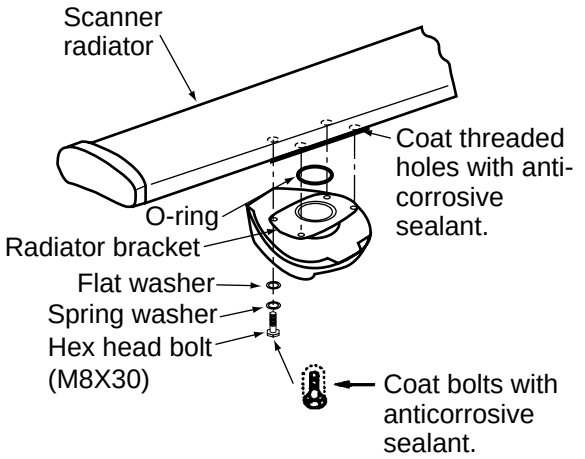


Figure 1-14 Fastening the radiator bracket to the antenna unit chassis

Mounting the antenna unit

The scanner unit can be mounted using the fixing holes on the outside (200 x 200mm) or inside (140 x 150mm) the scanner unit.

Outside fixing holes

Use the hex head bolt (supplied) to mount the scanner unit as below.

1. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.

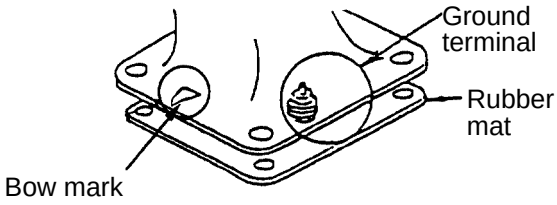
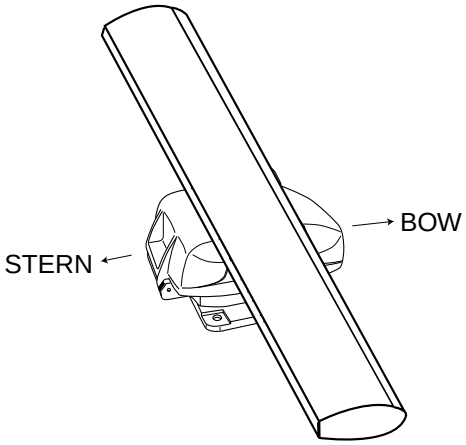


Figure 1-15 Location of rubber mat

2. Lay the antenna unit on the mounting platform, orienting it as shown in Figure 1-16.



⚠ CAUTION

Do not lift the antenna unit by the radiator; lift it by the housing.

The radiator may be damaged.

Figure 1-16 Antenna radiator of FRS-1000B, FRS-1000C

3. Insert four M12X55 hex bolts and seal washers from the top of the antenna housing. Insert the seal washers with the larger diameter next to the bolt heads. Be sure the seal washer, not other washers, is next to bolt head.

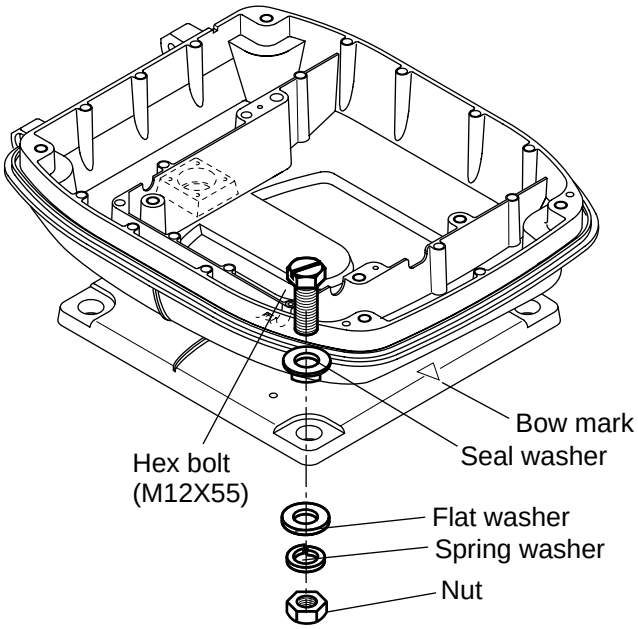


Figure 1-17 Fixing the antenna unit chassis

4. Pass flat washers, spring washers and nuts onto hex bolts. Fasten by tightening nuts. ***Do not fasten by tightening the hex bolts; seal washers may be damaged.***

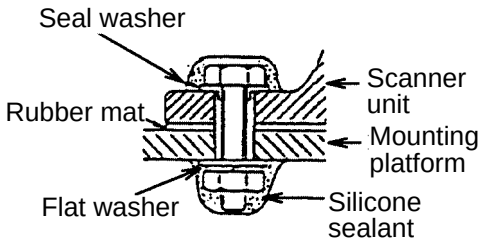


Figure 1-18 How to fasten antenna unit to mounting platform

5. Coat flat washers, spring washers, nuts and exposed parts of bolts with anticorrosive sealant.
6. Prepare ground point in mounting platform (within 300 mm of ground terminal on antenna unit) using M6X25 bolt, nut and flat washer.
7. Run the ground wire (RW-4747, 340 mm) between the ground terminal and ground point.

8. Coat ground terminal and ground point with silicone sealant as shown in Figure 1-19.

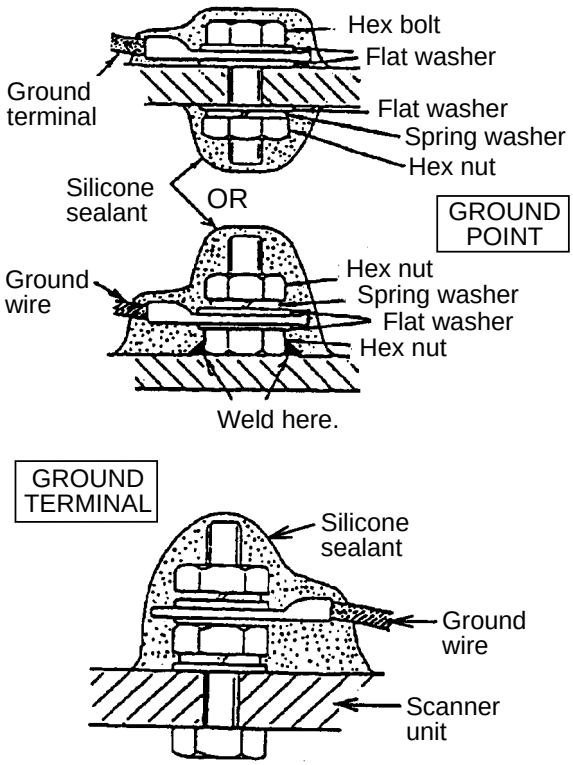


Figure 1-19 How to coat ground point and ground terminal with silicone sealant

Fixing holes inside szcanner unit

This method requires removal of the RF unit in the scanner unit to access inside fixing holes. Use hex head bolts, flat washers, spring washers and nuts (local supply) to mount the scanner unit, confirming lengh of bolts.

1. Loose four scanner bolts to open the scanner unit. Refer to Figure 1-20 for location.

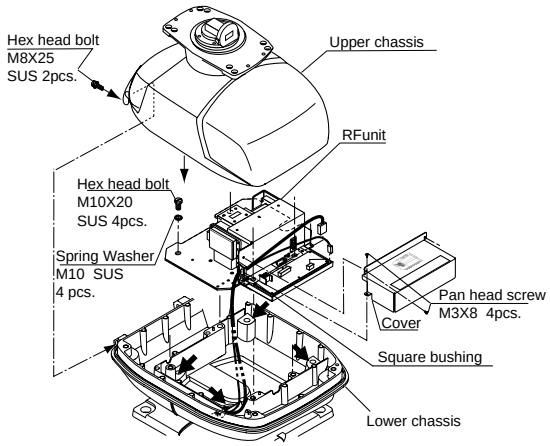


Figure 1-20 Scanner unit chassis, upper chassis separated

2. Unplug connector connected between upper and lower chassis.
3. Separate upper chassis from lower chassis by removing two hex head bolts.
4. Remove cover by unfastening four pan head screws.
5. Remove connector from RF unit .
6. Remove RF unit by unfastening four hex head bolts.
7. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
8. Fasten the lower chassis to the mounting platform with hex head bolts, spring washers, flat washers and nuts (local supply), and then coat flat washers, nuts and exposed parts of bolts with anticorrosive sealant. Cut a slit in rubber bushing and insert bolt into bushing. Do not use seal washers.
9. Reassemble RF unit, cover and upper chassis.
10. Set four knob caps (supplied) into outside fixing holes.
11. Do steps 6-8 in “Outside fixing holes”.

Connecting the signal cable

Only the signal cable runs from the display unit to the antenna unit. In order to minimize the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also, avoid running the cable in parallel with power cables. Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

1. Open the antenna cover by loosening two screws, and then fix the stay.

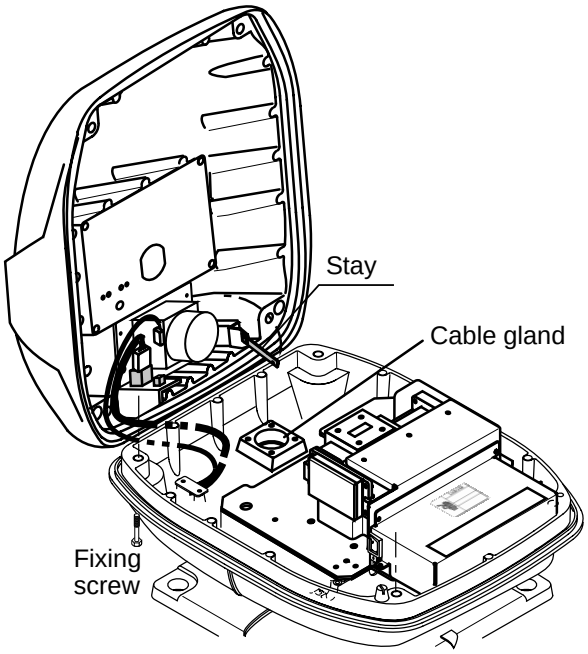


Figure 1-21 Antenna unit chassis, cover opened

2. Fabricate the signal cable as shown below.

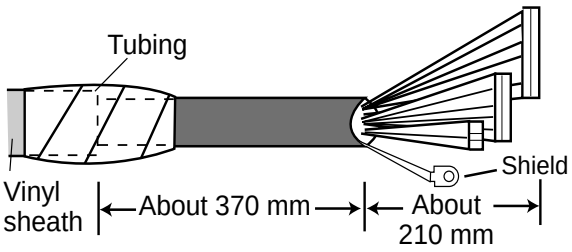


Figure 1-22 Fabrication of signal cable

3. Unfasten the cable gland assembly (plate, gasket, flat washer).
4. Pass the signal cable w/connector through the bottom of the antenna unit chassis. Pass the cable through the gland assembly as shown below.

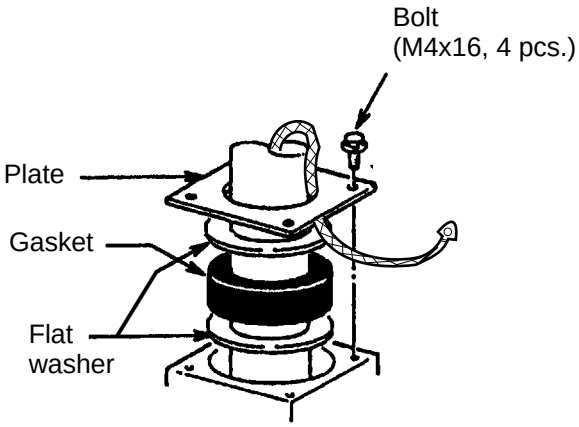


Figure 1-23 Passing the signal cable through the cable gland assembly

5. Fasten the crimp-on lug on the shield to one of the fixing bolts of the cable gland assembly.
6. Position the signal cable so that no more than 4 cm of the sheath is exposed as shown in the figure below. Tighten fixing bolts.

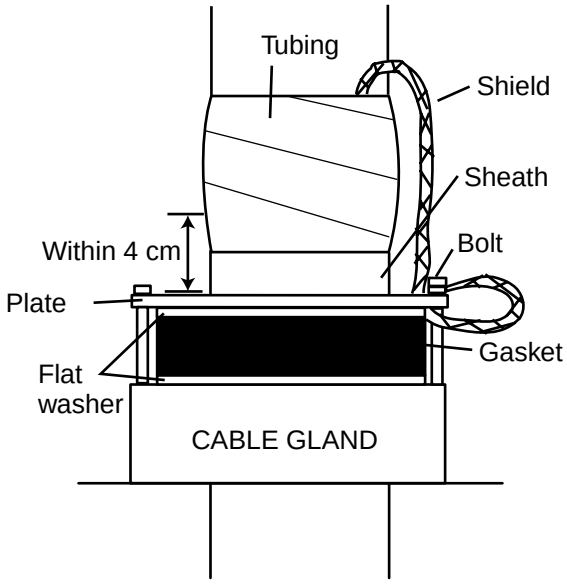


Figure 1-24 How to fix signal cable in cable gland

7. Unfasten four screws shown in the figure below.

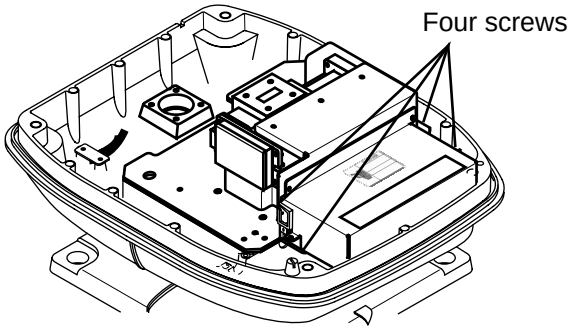


Figure 1-25 Antenna unit chassis, cover opened

8. Pass the signal cable through the square bushing.

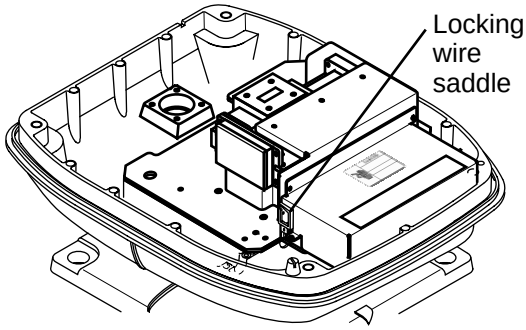


Figure 1-26 Antenna unit chassis, cover opened

9. Connect the signal cable to the RTB Board (03P9249), referring to the interconnection diagram and the figure below. Note that connector VH2P is not used.

10. Attach three EMI cores to the signal cable as shown below.

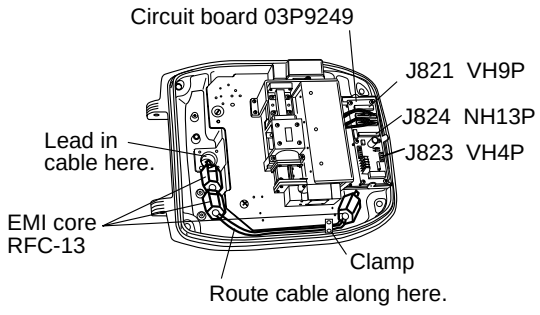


Figure 1-27 Antenna unit chassis, cover opened

11. Fix the signal cable with the cable clamp.

12. Release the stay and close the cover. Loosely fasten the cover fixing screws; you will have to make some adjustments inside after completion of wiring.

Note: When closing the cover, set the gaskets to grooves in the bottom chassis, then tighten bolts.

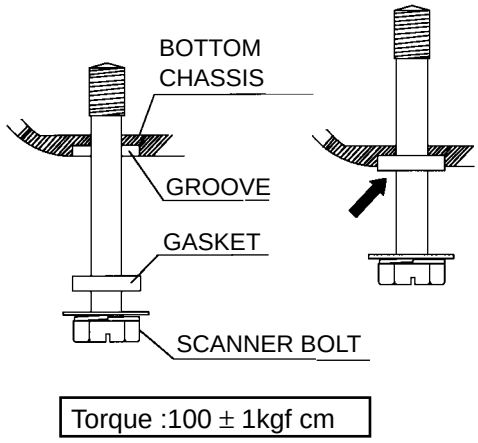


Figure 1-28 How to tighten cover fixing bolts

1.4 GPS Antenna

Mounting considerations

- Install the antenna unit referring to the installation diagram on page D-3, D-4. When selecting a mounting location for the antenna unit, keep in mind the following points.
- Select a location out of the radar beam. The radar beam will obstruct or prevent reception of the GPS satellite signal.
- Be sure the location offers a clean line-of-sight to satellite. Objects within line-of-sight to a satellite, for example, a mast or funnel, block reception and cause prolonged acquiring time or interruption of position fix.
- Mount the unit as high as possible. Mounting the antenna as high as possible keeps it free of water spray, which can intercept reception of GPS satellite signal, if water spray is frozen.

- A beacon antenna is required for use with the antenna GPA-018S. Use a 1.2 m whip antenna. Do not use a 2.5 m whip antenna; the antenna chassis may be damaged.
- For the GPA-018 and GPA-018S, ground them with a ground wire of IV-1.25 sq (local supply).

Extending antenna cable length

The standard cable is 15 m long. 30 m and 50 m long extension cable sets are optionally available.

Fabricate the end of antenna cable and attach the coaxial connector. Details are shown on next page.

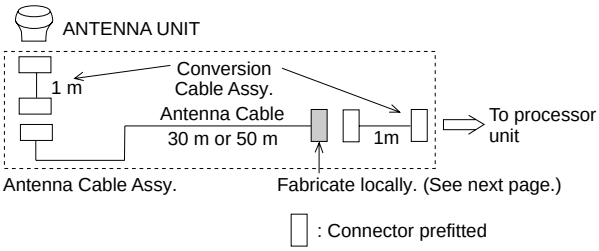


Figure 1-29 How to extend antenna cable

Antenna cable extension GP-018S

A cable with connector of 20 cm in length is supplied with the antenna unit. If extension is necessary, the optional antenna cable set, which comes in lengths of 30 m and 50 m, available.

Waterproofing the connector

Wrap connector with vulcanizing tape and then vinyl tape. Bind the tape end with cable-tie.

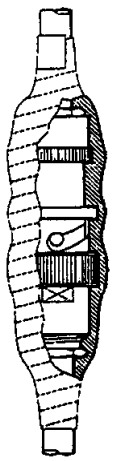


Figure 1-30 How to waterproof the connector

How to attach the N-P-8DFB connector

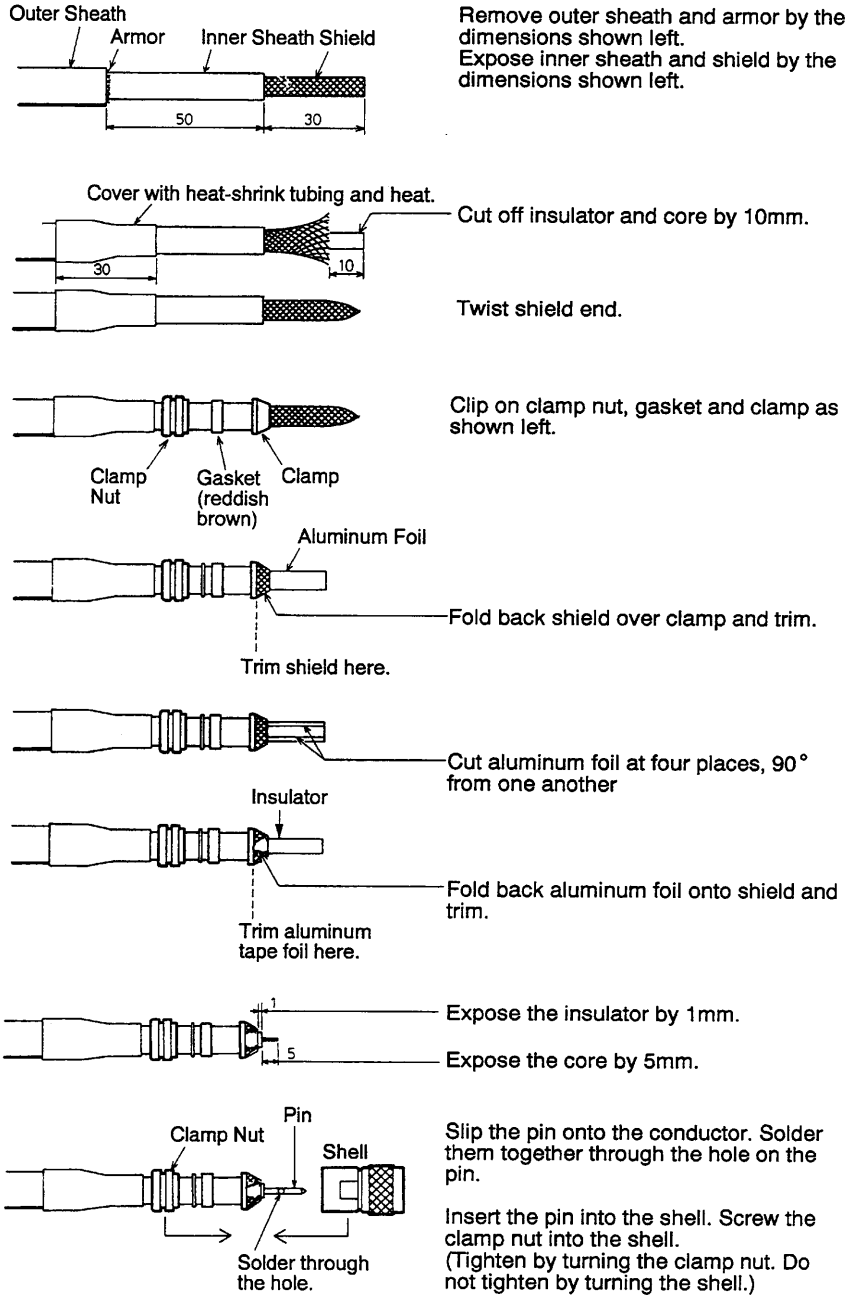

Outer Sheath
Armor
Inner Sheath Shield
50
30
Remove outer sheath and armor by the dimensions shown left.
Expose inner sheath and shield by the dimensions shown left.
Cover with heat-shrink tubing and heat.
30
10
Cut off insulator and core by 10mm.
Twist shield end.
Clamp Nut
Gasket (reddish brown)
Clamp
Clip on clamp nut, gasket and clamp as shown left.
Aluminum Foil
Fold back shield over clamp and trim.
Trim shield here.
Cut aluminum foil at four places, 90° from one another
Insulator
Fold back aluminum foil onto shield and trim.
Trim aluminum tape foil here.
1
5
Expose the insulator by 1mm.
Expose the core by 5mm.
Pin
Clamp Nut
Shell
Slip the pin onto the conductor. Solder them together through the hole on the pin.
Insert the pin into the shell. Screw the clamp nut into the shell.
(Tighten by turning the clamp nut. Do not tighten by turning the shell.)
Solder through the hole.

Figure 1-31 How to attach N-P-8DFB connector

DISPLAY UNIT, PROCESSOR UNIT

2.1 Display Unit

The display unit can be mounted on a tabletop (in a hanger) or in a panel. When selecting a mounting location, keep in mind the following points:

- Select a location where the display unit can be viewed and operated conveniently and where the screen can be viewed while facing towards the bow.
- Locate the unit out of direct sunlight and way from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- Determine the mounting location considering the length of the signal cable between the scanner unit and the display unit.
- Leave sufficient space on the sides and rear of the unit to facilitate maintenance. Also, leave a foot or so of “service loop” in cables behind the unit so it can be pulled forward for servicing or easy removal of connectors.
- A magnetic compass will be affected if placed too close to the display unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 1.10 m, Steering compass, 0.8 m.
- The sub-display unit is installed similar to the main display unit. The total length of cables between the processor unit, display unit and sub-display unit(s) shall not exceed 30 m. Performance cannot be guaranteed if this length is exceeded.
- If the mounting location is subject to heavy vibration, fix the display unit to the hanger perpendicular.

Tabletop mounting

Fix the hanger to the mounting location with five tapping screws. Set the knob bolts to the display unit. Set the display unit to the hanger and tighten knob bolts.

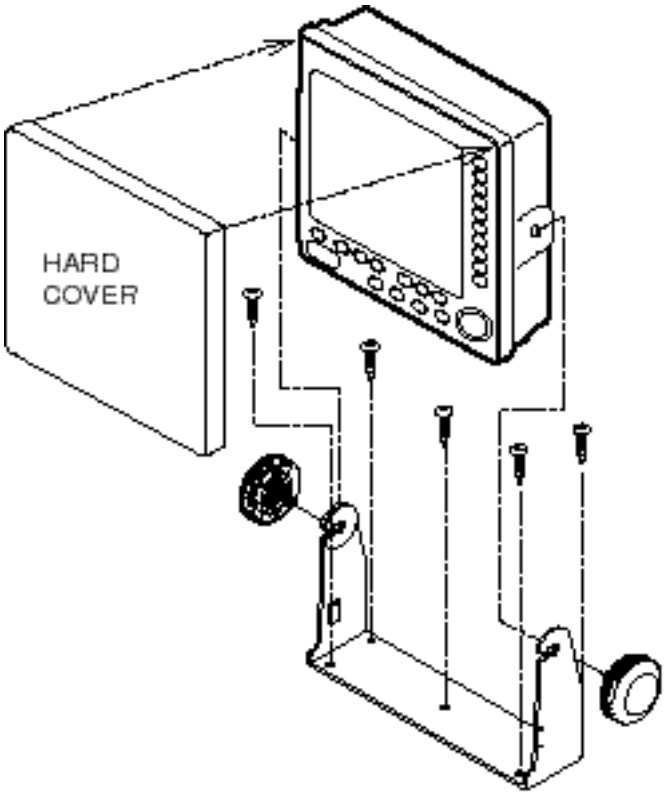


Figure 2-1 Mounting the display unit on a tabletop

Panel mounting

The display unit can be mounted in a panel by using the optional flush mount kit.

Flush mount kit OP86-9 (Code No. 006-968-130)

Name	Type	Code No.	Qty
Bracket	86-012-1101	100-264-700	1
Tapping Screw	5X20	000-802-840	4
Hex Bolt	M6X16	000-882-061	2

1. Prepare a cutout in the panel whose dimensions are 320 mm (H)X260 mm (W).
2. Fasten the display unit to the bracket (supplied) with hex bolts (supplied).
3. Fasten the display unit to the panel with tapping screws (4 pcs, 5X20, supplied).

2.2 Processor Unit

Mounting considerations

The processor unit can be mounted on a tabletop or in a panel (requires optional flush mount kit). When selecting a mounting location for the processor unit keep in mind the following points.

- Locate the unit where the card slot can be easily accessed.
- Locate the unit out of direct sunlight and way from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- Determine the mounting location considering the length of the signal cable between the processor unit and the display unit.
- Leave sufficient space on the sides and rear of the unit to facilitate maintenance. Also, leave a foot or so of “service loop” in cables behind the unit so it can be pulled forward for servicing or easy removal of connectors.
- A magnetic compass will be affected if placed too close to the processor unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 0.9 m, Steering compass, 0.7 m.

  The total length of cables between the processor unit, display unit and sub-display unit(s) shall not exceed 30 m.

Tableltop mounting

Fasten the fixing plate (supplied) to the mounting location with four tapping screws. Lay the processor unit on top of the fixing plate and fasten it with four tapping screws.

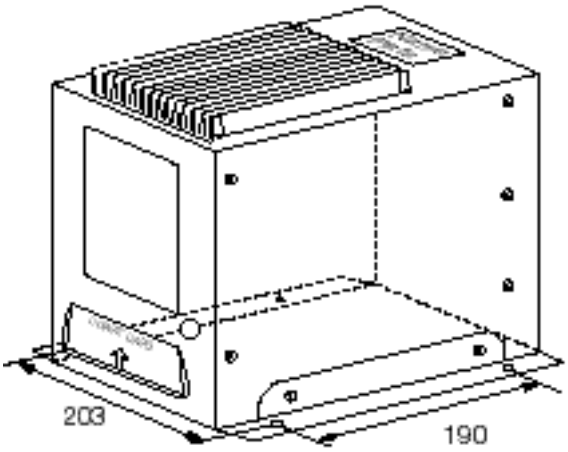


Figure 2-2 Mounting dimensions of processor unit

Flush mounting

1. Prepare a cutout in the panel whose dimensions are 256 mm (H) x 187 mm (W).
2. Remove four screws from the cover and use them to fasten the bracket (supplied) to the processor unit.
3. Fasten the display unit to the panel with tapping screws (supplied).

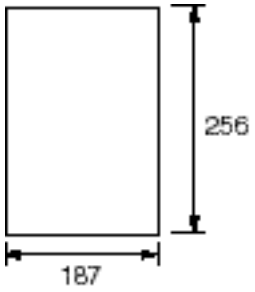


Figure 2-3 Cutout dimensions for flush mounting

3.1 Thru-hull Mount Transducer 520-5PSD, 520-5MSD

Transducer mounting location

This type of mounting provides the best performance of all, since the transducer protrudes from the hull and the effect of air bubbles and turbulence near the hull skin is reduced. When the boat has a keel, the transducer should be at least 30 cm away from it. Typical thru-hull mountings are shown in Figure 3-4.

The performance of this sounder is directly related to the mounting location of the transducer, especially for high-speed cruising. The installation should be planned in advance, keeping the cable length and the following factors in mind:

- Air bubbles and turbulence caused by movement of the boat seriously degrade the sounding capability of the transducer. The transducer should, therefore, be located in a position where water flow is the smoothest. Noise from the propellers also adversely affects performance and the transducer should not be mounted nearby. The lifting strakes are notorious for creating acoustic noise, and these must be avoided by keeping the transducer inboard of them.
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.
- A practical choice would be somewhere between 1/3 and 1/2 of the boat's length from the stern. For planing hulls, a practical location is generally rather far astern, so that the transducer is always in water regardless of the planing attitude.

Transducer outline drawings

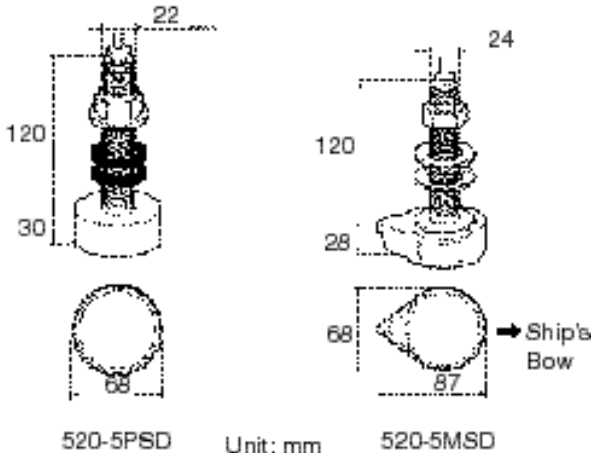


Figure 3-1 Dimensions of transducers 520-5PSD, 520-5MSD

Acceptable transducer mounting locations

Deep-V hull

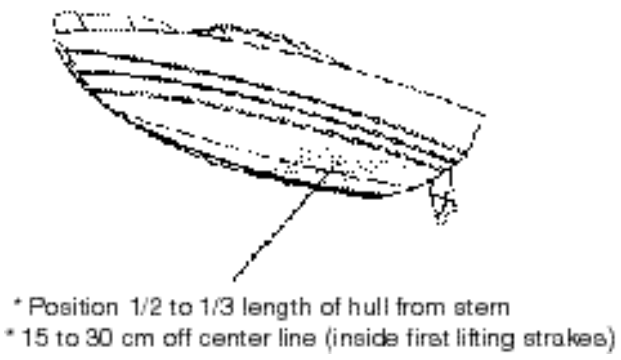


Figure 3-2 Transducer mounting location on deep-V hull

High speed V-planing hull

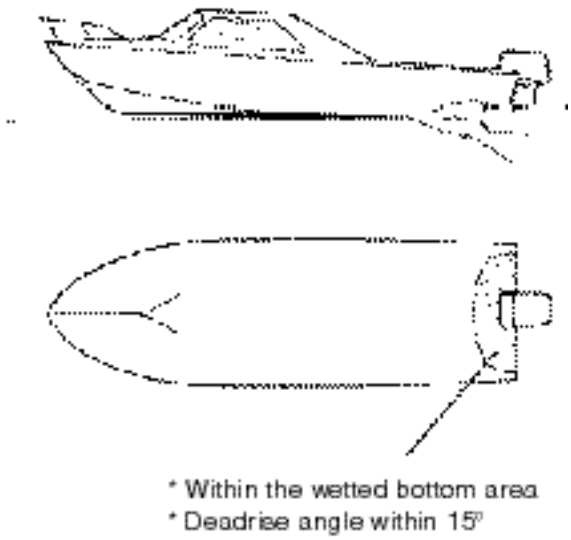


Figure 3-3 Transducer mounting location on high speed V-planing hull

Typical thru-hull mount transducer installations

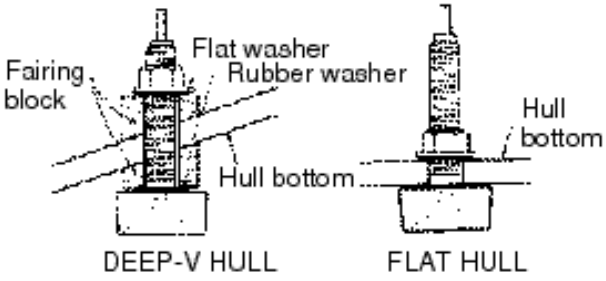


Figure 3-4 Typical thru-hull mount transducer installations

Procedure for installing the thru-hull mount transducer

1. With the boat hauled out of the water, mark the location selected for mounting the transducer on the bottom of the hull.
2. If the hull is not level within 15° in any direction, fairing blocks made out of teak should be used between the transducer and hull, both inside and outside, to keep the transducer face parallel with the water line. Fabricate the fairing block as shown below and make the entire surface as smooth as possible to provide an undisturbed flow of water around the transducer. The fairing block should be smaller than the transducer itself to provide a channel to divert turbulent water around the sides of the transducer rather than over its face.

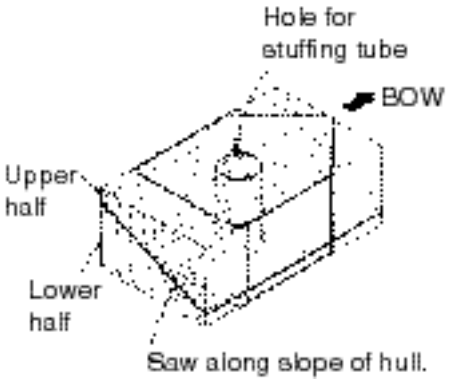


Figure 3-5 Construction of fairing block

3. Drill a hole just large enough to pass the threaded stuffing tube of the transducer through the hull, making sure it is drilled vertically.
4. Apply a sufficient amount of high quality caulking compound to the top surface of the transducer, around the threads of the stuffing tube and inside the mounting hole (and fairing blocks if used) to ensure watertight mounting.
5. Mount the transducer and fairing blocks and tighten the locking nuts. Be sure that the transducer is properly oriented and its working face is parallel to the waterline.

Note: Do not over-stress the stuffing tube and locking nuts through excessive tightening, since the wood block will swell when the boat is placed in the water. It is suggested that the nut be tightened lightly at installation and retightened several days after the boat has been launched.

3.2 Transom Mount Transducer 520-5PWD, Optional Transom Mount Triducer 520ST-PWD

This type of mounting is very commonly employed, usually on relatively small I/O or outboard boats. Do not use this method on an inboard motor boat because turbulence is created by the propeller ahead of the transducer.

There are two methods of installation: flush with hull (for flat hulls) and projecting from hull (for deep V-hulls).

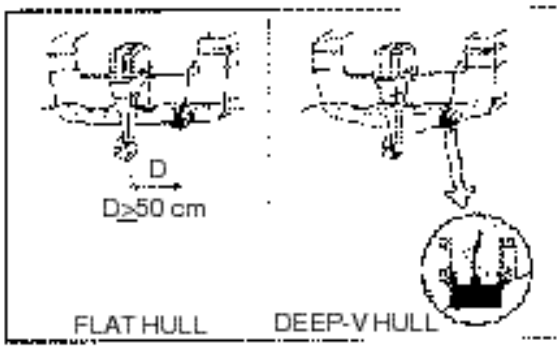


Figure 3-6 Transom mount transducer mounting locations

Installing the transom mount transducer flush with hull (for flat hulls)

A suitable mounting location is at least 50 cm away from the engine and where the water flow is smooth.

1. Drill four pilot holes in the mounting location.
2. Attach the transducer to the bracket with tapping screws (supplied).
3. Adjust the transducer position so the transducer faces right to the seabed.

   Note: If necessary, to improve water flow and minimize air bubbles staying on the transducer face, incline the transducer about 5° at the rear. This may require a certain amount of experimentation for fine tuning at high cruising speeds.
4. Fill the gap between the wedge front of the transducer and transom with epoxy material to eliminate any air spaces.

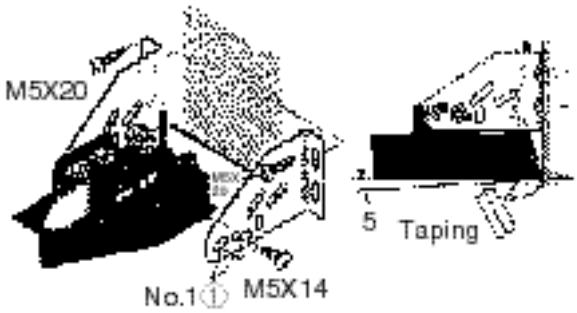


Figure 3-7 Transom mount transducer, mounting flush with hull

Installing the transom mount transducer projecting from hull (for deep-V hulls)

This method is employed on deep-V hulls and provides good performance because the effects of air bubbles are minimal. Install the transducer parallel with water surface; not flush with hull. If the boat is placed on a trailer care must be taken not to damage the transducer when the boat is hauled out of the water and put on the trailer.

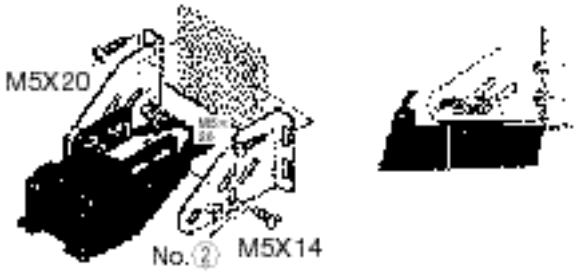


Figure 3-8 Transom mount transducer, projecting from hull

Transducer preparation

Before putting the boat in water, wipe the face of the transducer thoroughly with a detergent liquid soap. This will lessen the time necessary for the transducer to have good contact with the water. Otherwise the time required for complete “saturation” will be lengthened and performance will be reduced.

Do not paint the transducer. Performance will be affected.

3.3 Inside-hull Mount Transducer 520-5PSD, 520-5MSD

Necessary tools

You will need the following tools:

- Sandpaper (#100)
- Silicone sealant
- Silicone grease

Remarks on installation

- Turn off the engine and anchor the boat while installing the equipment.
- Install the transducer in the engine room.

Selecting the mounting location

Keep the following points in mind when selecting a mounting location:

- The mounting location should be where the hull is of single-hull thickness and is void of air or flotation materials other than solid fiberglass between the transducer face and the water.
- Do not place the transducer over hull struts or ribs which run under the hull.
- Avoid a location where the rising angle of the hull exceeds 15°, to minimize the effect of the boat's rolling.
- You will finalize the mounting location through some trial and error. The procedure for this is shown later.

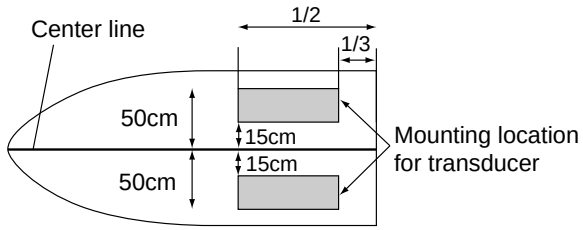


Figure 3-9 Inside-hull transducer mounting location

Attaching the transducer

1. Clean the transducer face to remove any foreign material. Lightly roughen the transducer face with #100 sandpaper. Also, roughen the inside of the hull where the transducer is to be mounted.
2. Warm the silicone sealant to 40°C before usage to soften it. Coat the transducer face and mounting location with silicone sealant.

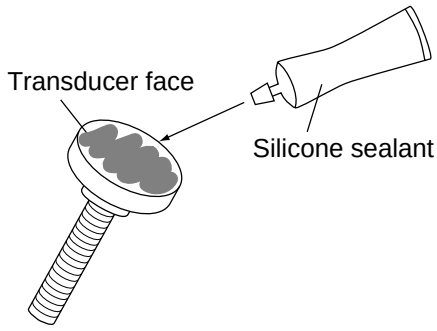


Figure 3-10 Coating the transducer face with silicone sealant

3. Press the transducer firmly down on the hull and gently twist it back and forth to remove any air which may be trapped in the silicone sealant.

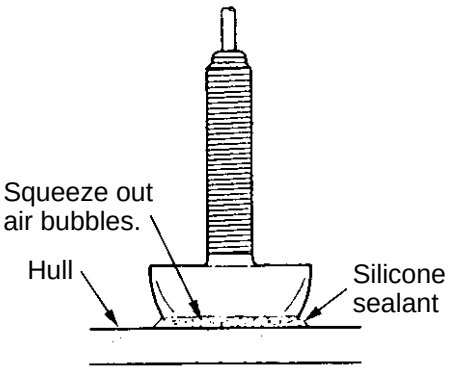


Figure 3-11 Attaching transducer to hull with silicone sealant

Checking the installation

1. Connect the battery to the display unit as shown on page 4-1.
2. Turn on the display unit.
3. Set the gain to “5” with the GAIN control.
4. Operate the RANGE control to set the range to 30 feet.
5. If the bottom is displayed in red and the depth indication appears the mounting location is suitable. You can leave the transducer in position.
6. If the bottom is not displayed in red, the mounting location is unsuitable. Do the following:
   1) Press the POWER key to turn off the power.
   2) Gently dismount the transducer with a piece of wood.
   3) Reattach the transducer elsewhere as shown in “Attaching the transducer.”
   4) Check the installation again.

Final preparation

Support the transducer with a piece of wood to keep it in place while it is drying. Let the transducer dry 24–72 hours.

3.4 Optional Water Temperature/Speed Sensors

Through-hull mount water temperature/speed sensor ST-02MSB

Select a suitable mounting location considering the following:

- Select a mid-boat flat position. The sensor does not have to be installed perfectly perpendicular. The sensor must not be damaged in dry-docking operation.
- Select a place apart from equipment generating heat.
- Select a place in the forward direction viewing from the drain hole, to allow for circulation of cooling water.
- Select a place free from vibration.

1. Dry-dock the boat.
2. Make a hole of approx. 51 mm diameter.
3. Unfasten locknut and remove the sensor section.
4. Apply high-grade sealant to the flange of the sensor.
5. Pass the sensor casing through the hole.
6. Face the notch on the sensor toward boat’s bow and tighten the flange.
7. Set the sensor section to the sensor casing and tighten the locknut.
8. Launch the boat and check for water leakage around the sensor.

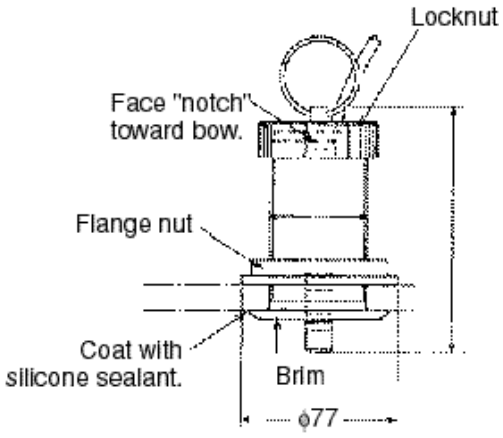


Figure 3-12 Water temperature/speed sensor ST-02MSB

3.5 Optional Water Temperature Sensors

Transom mount water temperature sensor T-02MTB

- Fix the cable at a convenient location with cable clamp.
- When the cable is led in through the transom board, make a hole of approx. 17 mm diameter to pass the connector. After passing the cable, fill the hole with a sealing compound.

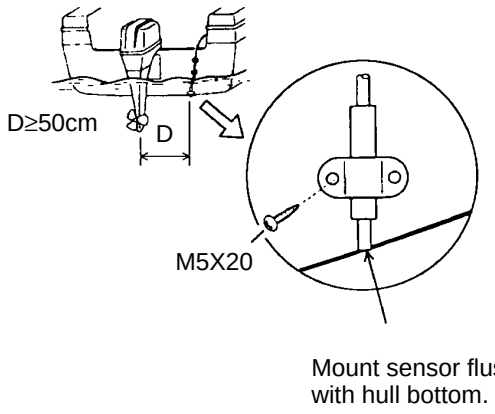


Figure 3-13 How to install transom mount water temperature sensor T-02MTB

Thru-hull mount water temperature sensor T-02MSB, T-03MSB

- Select a mid-boat flat position. The sensor does not have to be installed perfectly perpendicular. The sensor must not be damaged in dry-docking operation.
- Select a place apart from equipment generating heat.
- Select a place in the forward direction viewing from the drain hole, to allow for circulation of cooling water.
- Select a place free from vibration.

Install the sensor as shown in Figure 3-14.

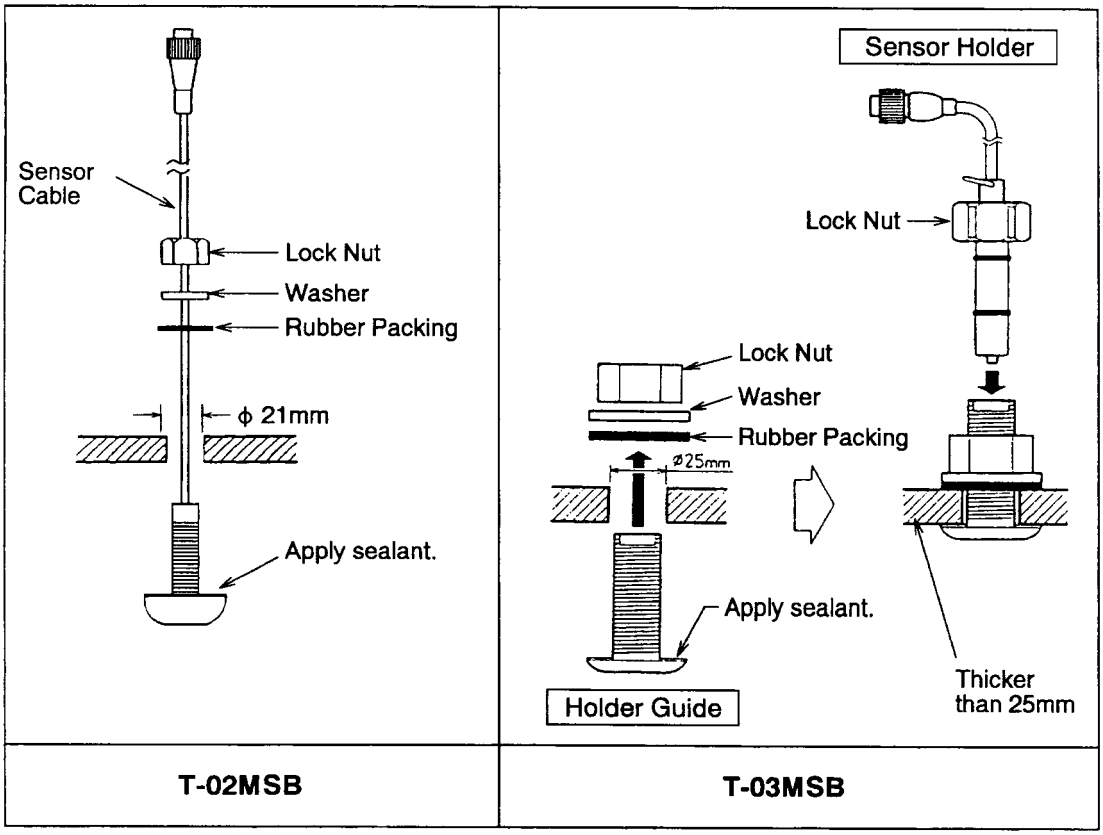
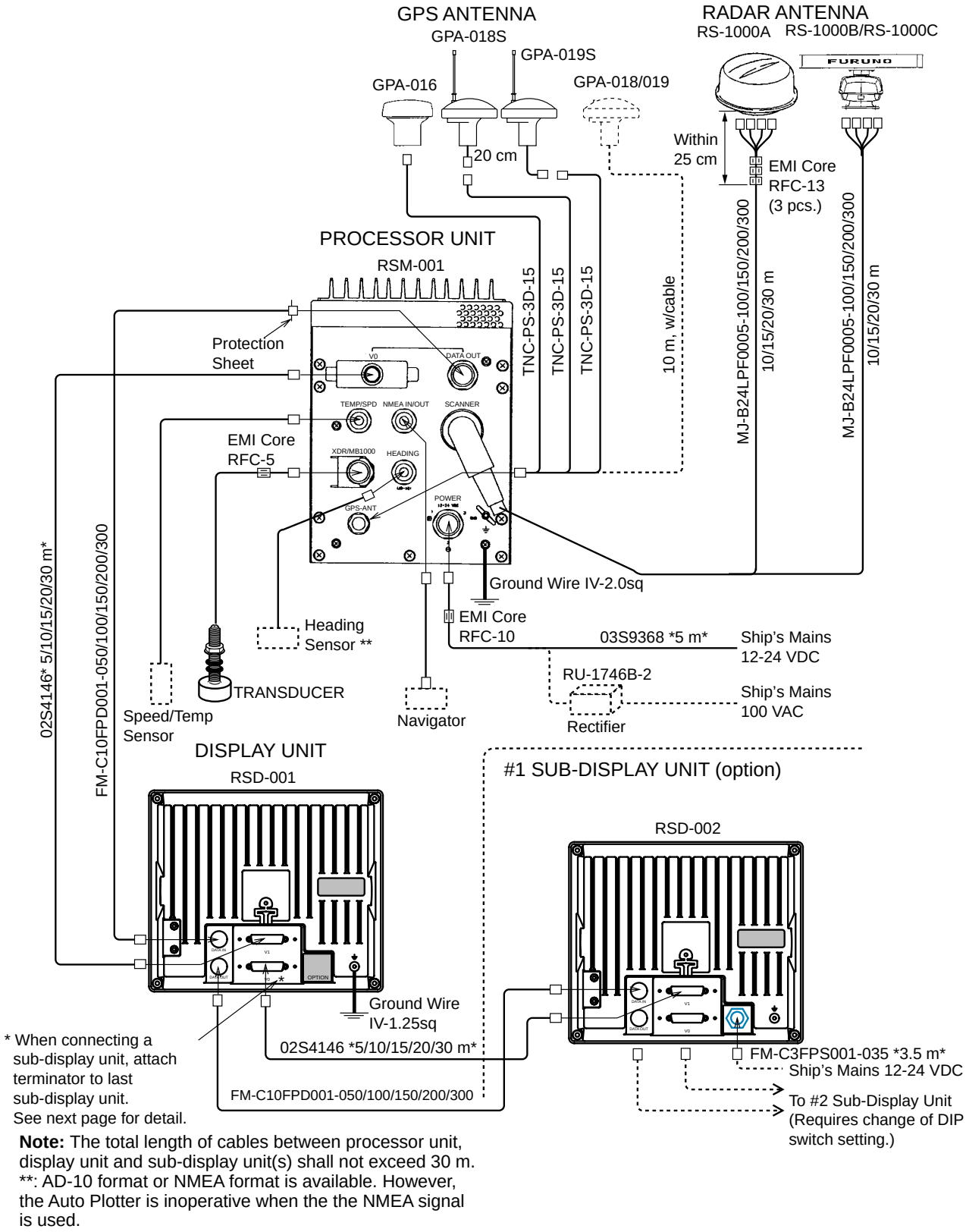


Figure 3-14 Thru-hull mount water temperature sensors T-02MSB, T-03MSB

4.1 General Wiring Diagram



Note: The total length of cables between processor unit, display unit and sub-display unit(s) shall not exceed 30 m.
**: AD-10 format or NMEA format is available. However, the Auto Plotter is inoperative when the the NMEA signal is used.

Figure 4-1 General wiring diagram

4.2 Attachment of Connector Safeguard Sheet

Attach the safeguard sheet (supplied) to the connector which is to be plugged into the DATA OUT on the signal processor unit, to prevent misconnection.*Do this before plugging in the connector.*

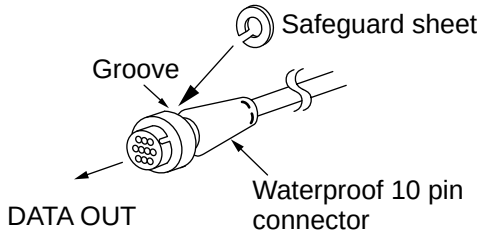


Figure 4-2 Waterproof 10 pin connector

4.3 Attachment of D-SUB Connector

Attach a D-SUB connector to the cable which runs between the display unit and sub-display unit, to preserve watertight integrity.

1. Set the D-SUB connector to the display unit and fasten it with two screws.
2. Cover connector with D-SUB cover.
3. Fasten D-SUB clamp with two screws.

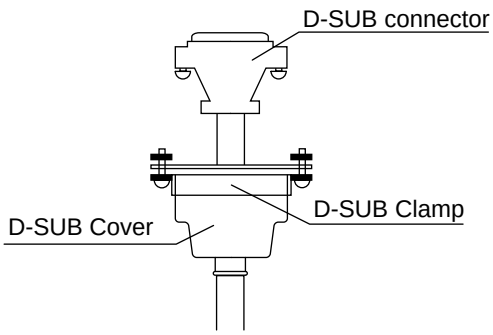


Figure 4-3 Attachment of D-SUB connector

4.4 Attachment of EMI Cores

Attach EMI cores to the locations shown in the table below to suppress noise.

Unit	Location	EMI Core	Qty
Processor Unit	Near power cable connector	RFC-10	1
	Near transducer cable XDR/MB-1000	RFC-5	1
FRS-1000A's antenna unit	Within 0.25 m of signal cable entrance	RFC-13	3

4.5 Terminator

An A-type terminator is attached (default setting) to the VO port at the rear of the display unit. If the cable length between the processor unit and display unit is longer than 15 m, or if the total cable length between the processor unit and sub-display unit(s) is longer than 15 m, replace the A-type terminator with B-type terminator (supplied as accessories).

If sub-display unit(s) is connected, attach the terminator to last sub-display unit.

One of two types of B-type terminators are connected. The new type has potentiometers for adjustment of the terminator; the former type does not. For details see page 5-7.

5.1 Opening the Installation Menus

Most radar adjustments and settings may be completed on the installation menus. The installation menus can be displayed as follows:

1. Press the [RDR MENU/ESC] key followed by the [0] key to display the RADAR menu.
2. Press the [3] key to display the installation menu. The installation menu consists of two pages of menus. You can switch between pages with the Page item.

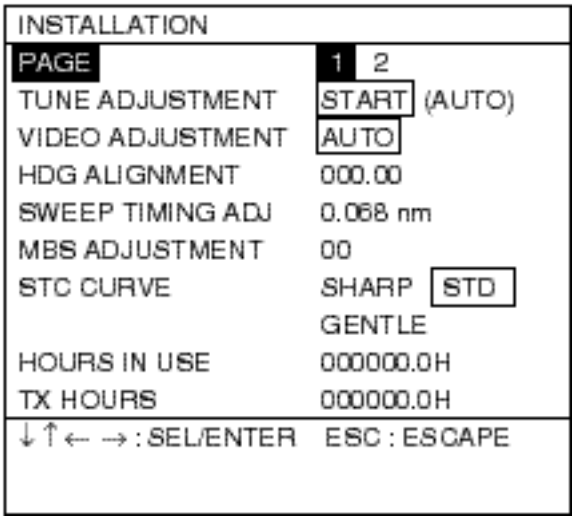


Figure 5-1 Installation menus

5.2 Tuning Adjustment

1. Select TUNE ADJUSTMENT from page 1 of the installation menu.
2. Press the [ENT] key.

5.3 Adjusting Sweep Timing

This adjustment ensures proper radar performance, especially on short ranges. The radar measures the time required for a transmitted echo to travel to the target and return to the source. The received echo appears on the display based on this time. Thus, at the instant the transmitter is fired, the sweep should start from the center of the display (sometimes called sweep origin).

A trigger pulse generated in the display unit goes to the antenna unit (via the processor unit) through the signal cable to trigger the transmitter (magnetron). The time taken by the signal to travel up to the antenna unit varies, depending largely on the length of the signal cable. During this period the display unit should wait before starting the sweep. When the display unit is not adjusted correctly, the echoes from a straight local object (for example, a harbor wall or straight pier) will not appear with straight edges – they will be seen as “pushed out” or “pulled in” near the picture center. The range of objects will also be incorrectly shown.

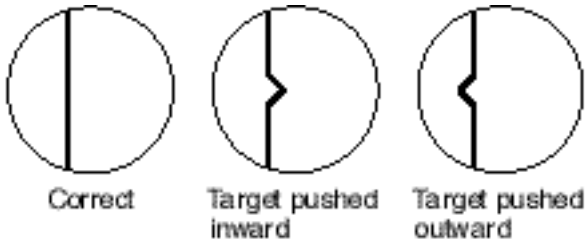


Figure 5-2 Examples of improper and correct sweep timing

1. Transmit on the smallest range, and adjust gain, A/C SEA and A/C RAIN.

2. Visually select a target which forms a straight line (for example, harbor wall, straight pier).
3. Select SWEEP TIMING ADJ from page 1 of the installation menus.
4. Using the omnipad, set suitable value (00.0 nm to 99.9 nm, default setting for FRS-1000B/FRS-1000C: 0.068) to straighten target.
5. Press the [ENT] key.
6. Confirm that target is straight. If not, repeat steps 3-5.

5.4 Video Level Adjustment

1. Select VIDEO ADJUSTMENT from page 1 of the installation menu.
2. Press the [ENT] key to adjust video automatically.

5.5 Heading Alignment

You have mounted the antenna unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading marker (zero degrees).

In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the antenna unit. The following adjustment will compensate for this error.

1. Set ship's heading toward a suitable target (for example, ship or buoy) at a range between 0.125 to 0.25 nautical mile.
2. Press [RDR MENU/ESC], [9] to transmit. Keep echoes in the outer half of the picture by changing the range. Also, be sure the zoom and off center functions are off.
3. Select HDG ALIGNMENT from page 1 of the installation menu.
4. Press the [ENT] key.
5. Rotate the EBL by omnipad to bisect the target with the EBL.
6. Press the [ENT] key.
7. As a final test, move the boat towards a small buoy and confirm that the buoy shows up dead ahead on the radar when it is visually dead ahead.

5.6 Adjusting MBS (Main Bang Suppression)

Main bang, a large filled circle which appears at the display center on short ranges, can be suppressed as follows:

1. Transmit on long range and wait 10 minutes.
2. Adjust gain so a slight amount of noise is present on the screen.
3. Transmit on the 0.125 nautical mile range. Adjust the A/C SEA for proper picture. (Keying sequence: [RDR MENU], [4], use omnipad to adjust, and press the [ENT] key.)
4. Select MBS ADJUSTMENT from page 1 of the installation menus.
5. Using the omnipad, set suitable value (00-25) to suppress main bang.
6. Press the [ENT] key.
7. Confirm that main bang is suppressed. If not, repeat steps 4-6.

5.7 Entering Antenna Height

Enter the height of the antenna above the waterline to optimize the STC curve.

1. Select page 2 of the installation menus.
1. Select ANTENNA HEIGHT.
3. Select antenna height; LOW, 3 m or less; MID, 3-6 m, HIGH, 6-10 m.
4. Press the [ENT] key.

5.8 STC Curve

The STC curve changes with antenna height. Set the curve, according to severity of sea surface reflections.

1. Select page 1 of the installation menus.
2. Select STC CURVE and desired option;
   - SHARP: Sea clutter reduction effective on short ranges
   - STD: Between SHARP and GENTLE
   - GENTLE: Sea clutter reduction extends to long ranges
3. Press the [ENT] key.

5.9 Checking Magnetron Heater Voltage

Magnetron heater voltage is formed on a circuit board in the antenna unit, and is preadjusted at the factory for use with any length of signal cable. Therefore no adjustment is required. However, check magnetron heater voltage as follows:

FRS-1000A

Magnetron heater voltage is formed on the PTU Board. Check that the voltage is within the rating as follows:

1. Press the [RDR MENU/ESC] key followed by the [9] key to set the radar in stand-by.
2. Select page 2 of the installation menus and set SCANNER ROTATION to STOP.
3. Open the antenna unit cover. Connect a multitester, set to 10 VDC range, between #4(+) and #6(-) pins of TP802 on the PTU Board.
4. The multitester should read between 7.4 and 7.6 V. If not, adjust R106 on the same board.
5. Close the radome cover and tighten fixing screws.
6. Select page 2 of the installation menus and set SCANNER ROTATION to ROTATE.

FRS-1000B, FRS-1000C

Magnetron heater voltage is formed on the RTB Board. Check that the voltage is within the rating as follows:

1. Press the [RDR MENU/ESC] key followed by the [9] key to set the radar in stand-by.
2. Select page 2 of the installation menus and set SCANNER ROTATION to STOP.

3. Open the antenna unit cover.
4. Unfasten four screws to remove shield cover shown below.

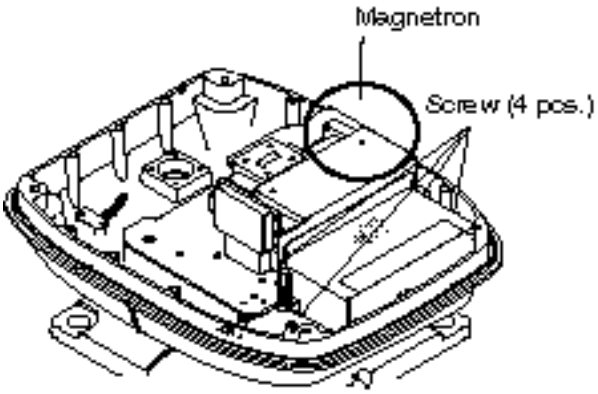


Figure 5-3 Antenna unit FRS-1000B, FRS-1000C, inside view

5. Connect a multitester, set to 10 VDC range, between #4(+) and #6(-) pins of J825 on the RTB Board.

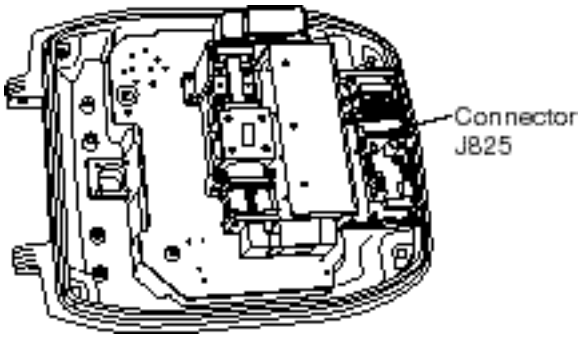


Figure 5-4 Antenna unit FRS-1000B, FRS-1000C, inside view

6. The multitester should read between 7.5±0.1 V.
7. Fasten the shield cover and close then antenna cover.
8. Select page 2 of the installation menus and set SCANNER ROTATION to ROTATE.

5.10 Transducer/Output Power and Internal Setting

The equipment is preset at the factory for transducer output power of 600 W and transducer type 520-5PSD, 520-PWD, or 520-5MSD. When the FURUNO 50B-xx, 200B-xx (1 kW) or the Airmar 1 kW transducer is used, change jumper wire settings on the circuit board 02P6223A in the processor unit as below.

Output power	Transducer	Setting on circuit board 02P6223A
600 W	520-5PSD 520-5PWD 520-5MSD	JP6: Short JP5: Open (Default setting)
1 kW	Airmar	JP5: Short JP6: Open
1 kW	50B-xx 200B-xx	

1. Unfasten 12 screws (M4X8, marked with # in figure below) and five screws (M3X8, marked with # in Figure 5-5) to remove the cover of the processor unit.

   Note: Remove chart card, memory card before removing the cover. Slide the cover towards you until it stops and then lift to remove.

2. Open or short JP5 and JP6 on the circuit board 02P6223A referring to table above.
3. Mount the cover.

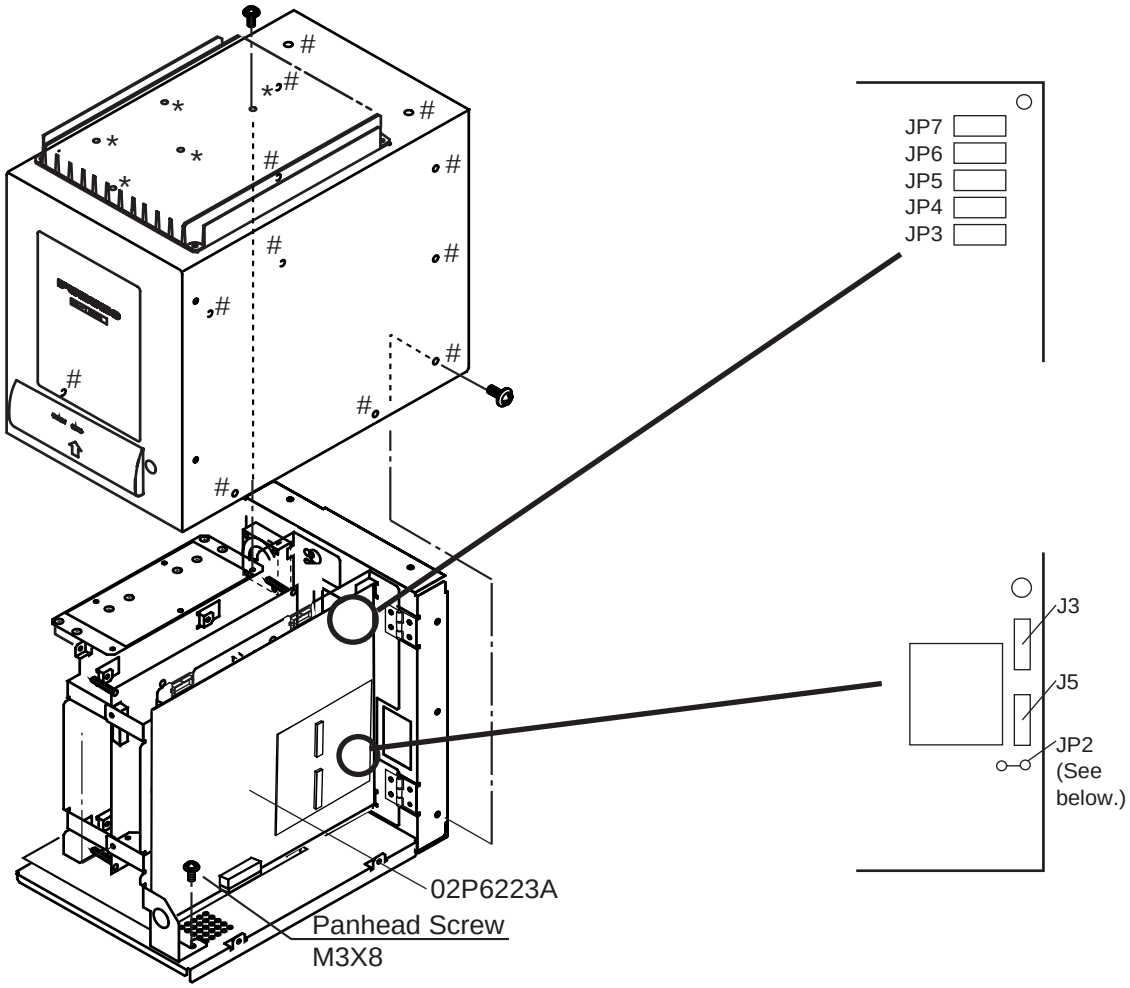


Figure 5-5 Processor unit, inside view

5.11 Connection of External Equipment (navaid NMEA0183)

The NAV IN/OUT port on the processor unit transmitts signal format of RS-422 or current loop. Change jumper setting of J2 on the circuit board 02P6223A in the processor unit according to the signal format of external equipment.

Signal format	02P6223A
RS-422	JP2: Short (Default setting)
Current loop	JP2: Cut pattern.

Refer to illustration above for the location of JP2. Connection differs with signal format.

RS-422 format

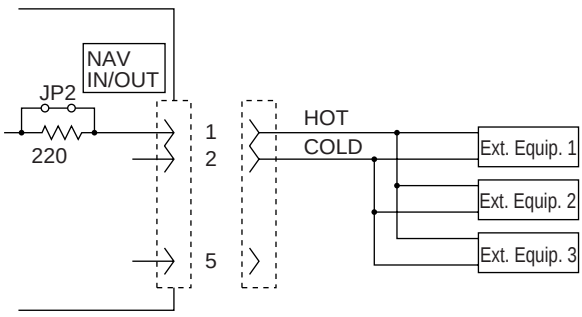


Figure 5-6 Connection of external equipment using RS-422 format

Current loop format

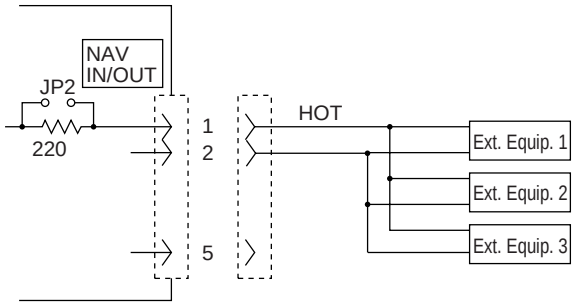


Figure 5-7 Connection of external equipment using current loop format

Note: When two or more external equipment are connected to the NAV IN/OUT port, or the resistance of the input resistor on the equipment is more than 100 ohms, cut jumper wire JP2 and solder a 220 ohm resistor at each end of JP2.

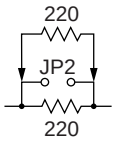


Figure 5-8 Attachment of resistors to JP2

5.12 Connection of Two Sub-Display Units

When two sub-display units are connected, the DIP switch S1 in the #2 sub-display unit should be changed as below.

	DIP Switch S1	
#1 Sub-display unit (no change necessary)	#1 only	1 2 3 4 ON ■ S1 (Default setting) Sub-display unit #1
#2 Sub-display unit (change necessary)	#2 only: ON	1 2 3 4 ON ■ Sub-display unit #2

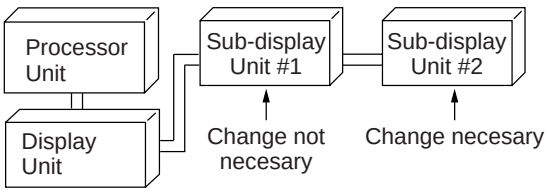


Figure 5-9 DIP switch S1 setting

1. Lay a soft cloth on the work area to protect the LCD panel. Lay sub-display unit LCD panel side down on the work area.
2. Unfasten eight screws on the rear panel.
3. Unfasten the nut of 3P and 10P connectors (POWER, DATA IN, DATA OUT).
4. Unfasten four hex bolts from the DSUB connector.

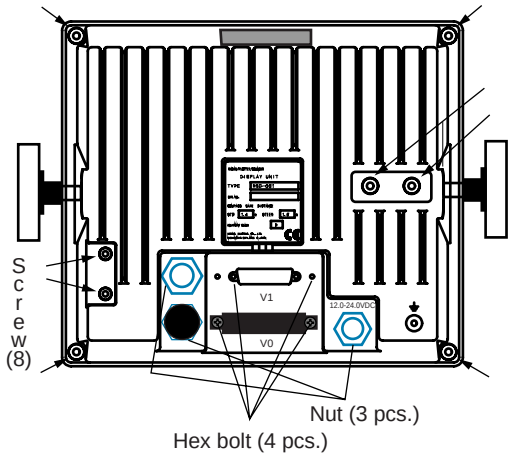


Figure 5-10 Sub-display unit, rear view

5. Lift the rear panel.
6. Change setting of the DIP switch S1 on the MCU Board 22P6225.

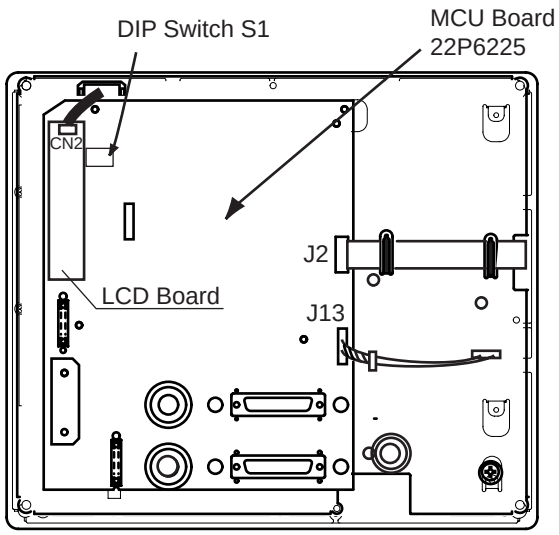


Figure 5-11 Sub-display unit, rear view, rear panel removed

7. Checking that the waterproofing gasket is in place, mount the rear panel. Reassemble the unit.

5.13 Adjustment of Terminator B

This equipment may have a new type of terminator B. The new type may be adjusted; the former type could not. When the length of the video cable is more than 15 meters, or the length is less than 15 meters and three display units are connected, the terminator should be adjusted since the length of the video cable affects the video sounder picture.

The terminator B can be seen on the circuit board which is visible from the hole for the connection cable. If the terminator B is blue it is the former type.

If the new type terminator B is required, order it as follows: Type: OP86-10, Code No.: 006-969-140.

Normally, no adjustment of the terminator B is necessary. However, if a black tail is painted on the video sounder picture, adjust the terminator as follows:

1. Unfasten the terminator housing.
2. Unplug the video cable (DSUB connector) connected to the last sub-display unit and connect it to the VO terminal.
3. Attach the terminator B to the VI terminal. (The parts side is up. There are three potentiometers on the circuit board, and their colors are from left, red, green, blue.)
4. Using a slotted-head screwdriver, adjust the blue potentiometer such that the black tail just disappears. (Normally it is not necessary to rotate the potentiometer more than ±90°. However, no abnormal condition will result if it is rotated more than this value. Insert the blade of the screwdriver at an angle to adjust.)
5. Turn off the power. Refasten the housing to the terminator and attach it to the VO terminal. (As long as the terminator is properly adjusted, the video cable may be attached to the VI or VO terminal.)

Note: Be sure to attach the waterproofing cap.

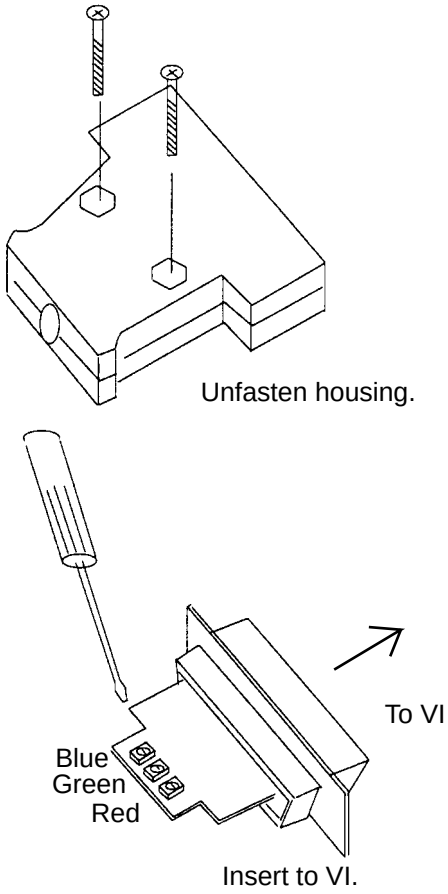


Figure 5-12 Terminator B

INSTALLATION OF OPTIONAL EQUIPMENT

6.1 Auto Plotter ARP-10

The ARP-10 requires heading signal (gyro-compass or heading sensor (PG-1000, etc., 25 msec, AD format) and speed signal (GPS, etc., NMEA0183 format).

Note: When the display data cable between the signal processor unit and display unit is unplugged power is impressed on the circuit boards in the processor unit. Therefore, unplug the power connector before opening the cover.

Necessary parts

ARP-10 installation kit (Code no. 000-086-852)

Name	Type	Code No.	Qty
ARP-10 Board	18P9007	008-476-930	1
Spacer*	SQ-20	000-801-650	3
Spring Washer*	M3 C5191W	000-864-204	3
Panhead Screw	M3 x 8 C2700W	000-881-404	5
Binding Screw*	M3 x 8 SWRM10	000-805-774	3

* Spacers, spring washers, binding screws not used.

1. Unfasten 12 screws (M4X8, marked with # in Figure 6-1) and five screws (M3X8, marked with * in Figure 6-1) to remove the cover of the processor unit.
2. As shown below, unfasten three screws to open the plotter/sounder section.

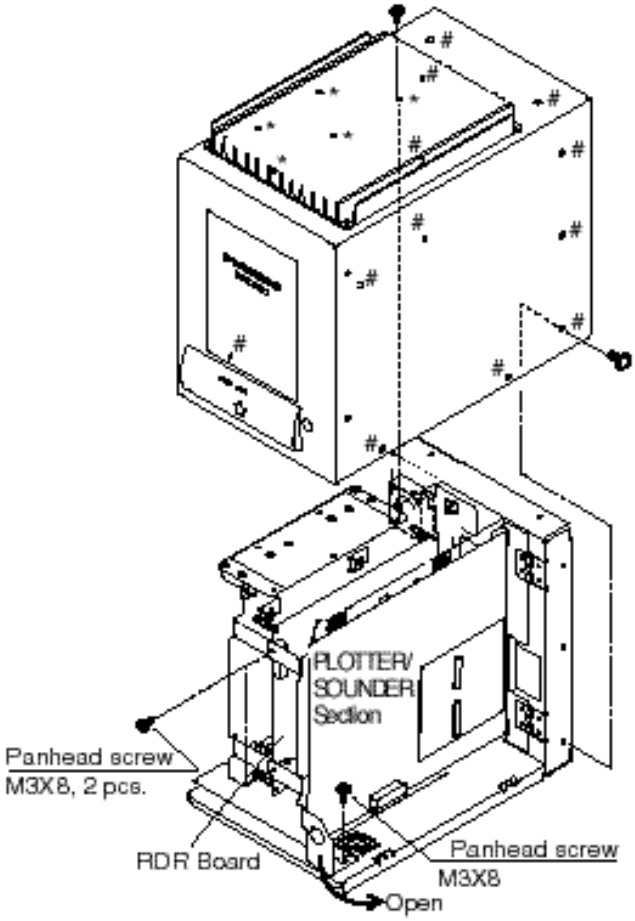


Figure 6-1 Processor unit, cover opened

3. Unfasten all connectors from the RDR Board.

   Note: When unfastening connector use one hand to hold circuit board and the other to unfasten connector. This will prevent accidental removal of parts on the circuit board.

4. Unfasten four screws to remove the RDR Board.

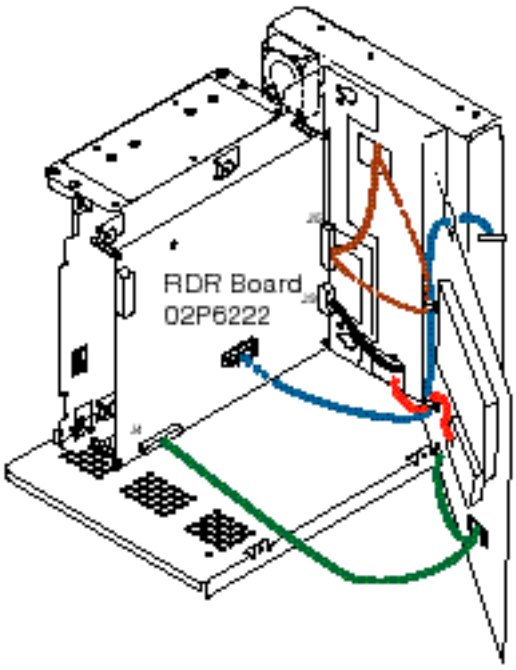


Figure 6-2 Processor unit, cover opened

5. Mount the ARP-10 as follows:
   1) Fasten the ARP-10 Board to the location shown below with five panhead screws (supplied).
   2) Connect the connectors to J5 and J3 on the RDR Board.
   3) Connect P107 from the ARP Board to J107 on the RDR Board. Mount the RDR Board with four screws.
6. Fasten connectors on the RDR Board. Close the cover.

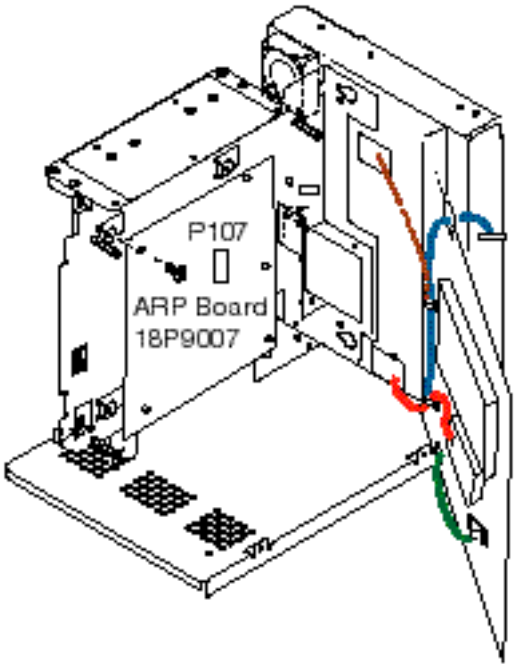


Figure 6-3 Processor unit, cover opened

Checking

1. Turn on the radar and transmit. (Keying sequence: [RDR MENU/ESC], [9].)
2. Press the [RDR MENU/ESC] key followed by the [2] key.
3. Press the [1] key to select MEMORY & I/O PORT.
4. Confirm that ARP TEST results show OK for SPEED, COURSE, TRIGGER, BP, HP and VIDEO.
5. Adjust GAIN, A/C SEA, A/C RAIN so that the figure for FE-DATA 1 and FE-DATA 2 shows less than 1,000. Check that targets can be acquired automatically as follows:
   a) Press [RDR MENU/ESC], [0], [,6], set ARP DISPLAY to YES, and press the [RDR MENU/ESC] key.
   b) Press [RDR MENU/ESC], [0], [5], set AUTO ACQ to ON, and press the [RDR MENU/ESC] key. Check that targets are automatically acquired.

6.2 Beacon Receiver Kit

DGPS function is available with the addition of a Beacon Receiver Kit. Two kits are available: GR-802-10 and GR-802-15, and they mostly consist of a DPGS antenna and beacon receiver circuit board.

Beacon receiver installation kit GR-802-10

Name	Type	Code No.	Remarks
Antenna Unit	GPA-018	000-041-471	10 m, w/cable
Beacon Receiver Board	GR-8020	000-141-046	
Cable Assy.	S.FL2-2LP 0.7DWHA	000-134-635	
Grommet	G-116	000-808-703	2 pcs.

Beacon receiver installation kit GR-802-15

Name	Type	Code No.	Remarks
Scanner Unit	GPA-018S	000-041-462	20 cm, w/cable
Beacon Receiver Board	GR-8020	000-141-046	
Cable Assy.	S.FL2-2LP 0.7DWHA	000-134-635	
Antenna Cable Inst. Materials	GP20-00551	004-366-610	See packing list.
Grommet	G-116	000-808-703	2 pcs.

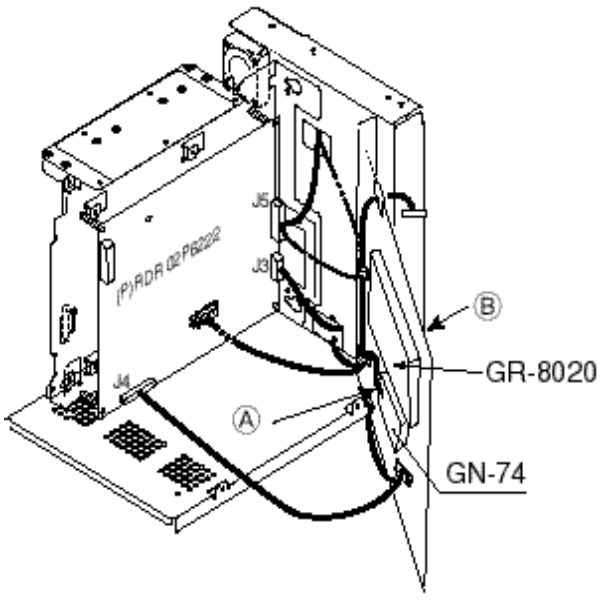


Figure 6-4 Processor unit, cover removed

Kit GR-802-15 additionally requires a coaxial cable:

Antenna cable assy: TNC-PS-3D-15, 15 m
Antenna cable set: CP20-01700, 30 m
Antenna cable set: CP20-01710, 50 m

If the antenna GPA-016 or GPA-018 is currently being used, replace it with the GPA-018S. For installation of the GPA-018S, see the outline drawing on page D-3 and D-4 and page 1-8 and 1-9.

Install the beacon receiver board in the processor unit as follows:

1. Referring to illustration on page 6-1, remove the cover and open the plotter/sounder section.
2. Fasten the beacon receiver board GR-8020 to the plotter/sounder section.
3. Cut a slit in one grommet (two supplied).
4. Facing the slit in grommet upward, insert it in groove near J1.

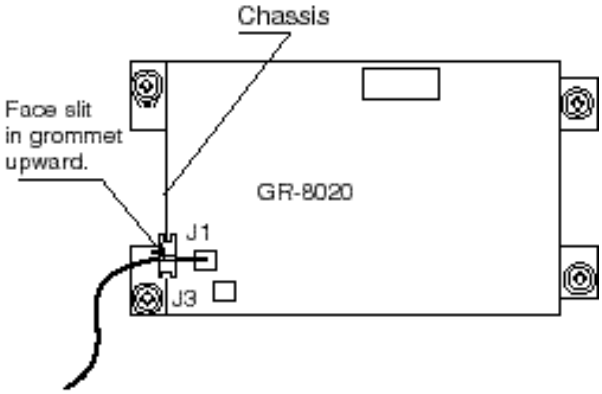


Figure 6-5 Beacon Receiver Board

5. Unplug the coaxial connector connected to GN-74 and plug it in to J1 on the beacon receiver board, and set its cable to the grommet.

6. Plug in the cable assemblies FL2-2LP0.7DWHA (supplied with kit) to J3 on the beacon receiver board and the coaxial jack on the GN-74.

Handling of Coaxial Cable

- Do not touch the connector with bare hands; use gloves.
- Use radio pincers to remove, and pull out straightly.
- Plug in connector straightly.

7. Close the lid.
8. Insert slide side of grommet in lid with tweezers or similar tool.

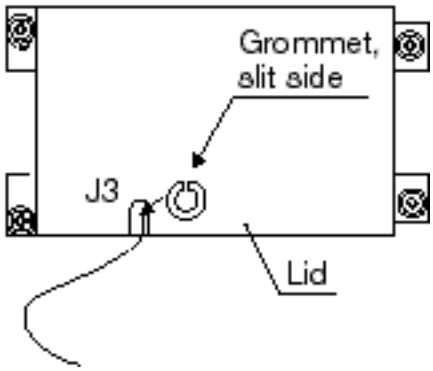


Figure 6-6 Beacon Receiver Board

9. Connect the cable connected to J8 on the plotter/sounder section's PSP Board 02P6223 to J2 on the GR-8020 Board.

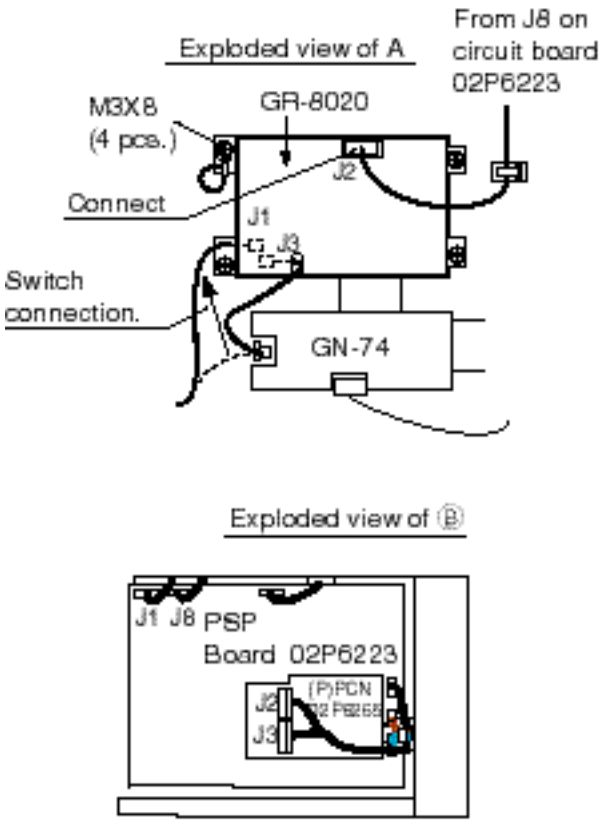


Figure 6-7 Processor unit, inside view

10. Reassemble the processor unit.

EXTERNAL INPUT/OUTPUT SIGNAL

7.1 Input Signal

Talker	Sentence	Remarks
*2	GGA	
*2	GLL	
*2	RMA	
*2	RMC	
*2	ZDA	
*2	BWR	
*1	MTW	In case of no sounder
*2	VTG	
*1	TLL	
*2	WPL	
*1	DPT	
*1	DBT	
*1	DBS	

*1: Any talker

*2: Talker selected at “Navaid” on page 1 of the plotter System Setting menu:

Loran C: LC
Decca: DE
GPS:GP
All: GP, DE, LC

Priority

L/L data

GP/All: RMC>RMA>GLL>GGA

LC/DE: RMA>RMC>GLL>GGA

Speed/Course

GP/All: RMC>RMA>VTG

LC/DE: RMA>RMC>VTG

Depth data

DPT>DBT>DBS

7.2 Output Signal

Talker	Sentence	Format
*4	AAM	*1
	APA	*1
	VTG	
	XTE	
	APB	*1 Waypoints entered
	BOD	*1
	RMC	
	BWR	*2, *3
	GGA	*2, *3 Position data, time data
	GLL	*2, *3 Own position data
	ZDA	*2, *3
	MTW	*2
	DBT	*2
	DPT	*2
	RMB	Destination selected
	WPL	Waypoints entered

*1: Autopilot selected as External Device on page 2 of System Setting menu.

*2: Remote selected as External Device on page 2 of System Setting menu.

*3: Navaid selected as External Device on page 2 of System Setting menu.

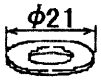
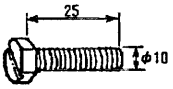
*4: Talker selected at “Navaid” on page 1 of the plotter System Setting menu.

FURUNO

CODE NO.	008-478-750	86AM-X-9406 -3
TYPE	CP03-16901	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	EMCｺｱ EMC CORE		E04SS251512 CODE NO. 000-144-673	1	
2	ﾐｶﾞｷ平座金 FLAT WASHER		M10 SUS304 CODE NO. 000-864-131	4	
3	ﾊﾞﾈ座金 SPRING WASHER		M10 SUS304 CODE NO. 000-864-261	4	
4	六角ﾎﾞﾙﾄ ｽﾘ割 HEX.BOLT (SLOTTED HEAD)		M10X25 SUS304 CODE NO. 000-862-308	4	

DWG NO.
C3446-M06- D

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

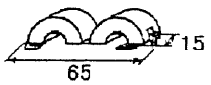
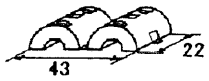
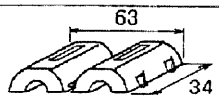
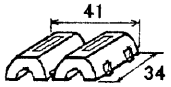
CODE NO.	006-968-490	86AM-X-9409 -2
TYPE	CP86-00502	1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000　レーダー・プロッタ魚探

RADAR･PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	EMIコア EMI CORE		TFC-25-15-12 CODE NO. 000-129-693	1	
2	EMIコア EMI CORE		TFC-16-8-16 CODE NO. 000-129-907	2	
3	EMIコア EMI CORE		RFC-13 CODE NO. 000-141-084	3	
4	EMIコア EMI CORE		RFC-5 CODE NO. 000-141-449	1	

DWG NO.
C3446-M10- C

FURUNO ELECTRIC CO., LTD

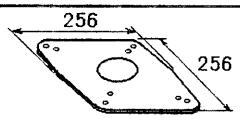
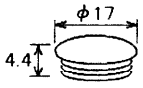
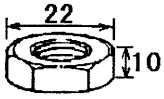
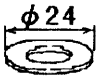
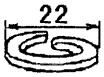
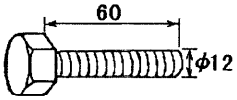
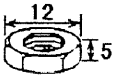
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-503-360	03FR-X-9401 -7
TYPE	CP03-18401	1/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｼｰﾙﾜｯｼｬ SEAL WASHER		03-001-3002-0 CODE NO. 300-130-020	4	
2	防蝕ゴム CORROSION-PROOF RUBBER MAT		03-142-3001-0 CODE NO. 100-275-580	1	
3	ｷｬｯﾌﾟ CAP		040-4010 CODE NO. 000-515-332	4	
4	六角ﾅｯﾄ 1種 HEX.NUT		M12 SUS304 CODE NO. 000-863-112	4	
5	ﾐｶﾞｷ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	4	
6	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	4	
7	六角ﾎﾞﾙﾄ（全ﾈｼﾞ） HEX. BOLT		M12X60 SUS304 CODE NO. 000-862-191	4	
8	六角ﾅｯﾄ 1種 HEX.NUT		M6 SUS304 CODE NO. 000-863-109	1	
9	ﾐｶﾞｷ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	
10	ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	

DWG NO.
C3459-M02- G

FURUNO ELECTRIC CO., LTD.

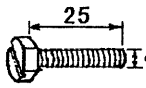
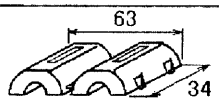
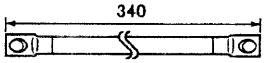
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-503-360	03FR-X-9401-7
TYPE	CP03-18401	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ボルト HEX.BOLT		M6X25 SUS304 CODE NO. 000-862-180	1	
12	EMIコア EMI CORE		RFC-13 CODE NO. 000-141-084	3	
13	アース線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	1	

DWG NO.
C3459-M04- G

FURUNO ELECTRIC CO., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

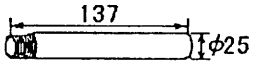
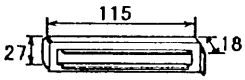
CODE NO.	004-365-780	86AM-X-9401 -1
TYPE	CP20-01111	1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000　レーダ・プロッタ魚探

RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾎｰｽｸﾗﾝﾌﾟ HOSE CLAMP		NO6348 SUS303 CODE NO. 000-805-906	2	
2	ﾊﾟｲﾌﾟ PIPE		20-007-3011-2 CODE NO. 100-183-262	1	
3	取付補助金具 INSTALLING SPACER		20-007-3012-1 CODE NO. 100-183-271	1	

DWG NO.
C3446-M01- B

FURUNO ELECTRIC CO., LTD

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

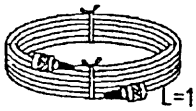
CODE NO.		86AM-X-9402 -1
TYPE		1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000　レーダ・プロッタ魚探

RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	アンテナケーブル組品 ANTENNA CABLE ASSY.		TNC-PS-3D-15 20S0216 CODE NO. 000-133-670	1	
2	ケーブル（組品） CABLE ASSY.		03S9368 *5M* CODE NO. 000-139-872	1	

DWG NO.
C3446-M02- B

FURUNO ELECTRIC CO., LTD

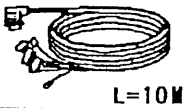
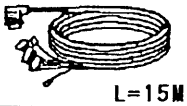
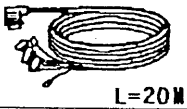
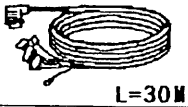
（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.		86AM-X-9403 -1
TYPE		1/1

工事材料表
INSTALLATION MATERIALS

RS-1000/FRS-1000　レーダ・プロッタ魚探
RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=10M	MJ-B24LPF0005-100 CODE NO. 000-140-434	1	選択 TO BE SELECTED
2	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=15M	MJ-B24LPF0005-150 CODE NO. 000-140-435	1	選択 TO BE SELECTED
3	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=20M	MJ-B24LPF0005-200 CODE NO. 000-140-436	1	選択 TO BE SELECTED
4	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=30M	MJ-B24LPF0005-300 CODE NO. 000-140-437	1	選択 TO BE SELECTED

DWG NO.
C3446-M03- B

FURUNO ELECTRIC CO., LTD

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

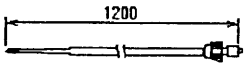
CODE NO.		86AM-X-9404 -1
TYPE		1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000　レーダ・プロッタ魚探

RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ホイップアンテナ WHIP ANTENNA		FAW-1.2		1	
			CODE NO.	000-130-046		

DWG NO.
C3446-M04- B

FURUNO ELECTRIC CO., LTD

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

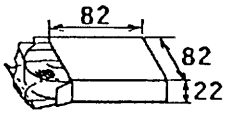
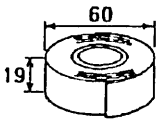
CODE NO.	004-366-610	86AM-X-9405 -1
TYPE	CP20-00551	1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000　レダー・プロッタ魚探

RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	絶縁テープ SELF-BONDING TAPE		Uテープ　0.5X19X5M CODE NO. 000-800-985	1	
2	ビニールテープ VINYL TAPE		NO360 02X19X10000 クロ　エスロン CODE NO. 000-835-215	1	

DWG NO.
C3446-M05- B

FURUNO ELECTRIC CO . , LTD

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

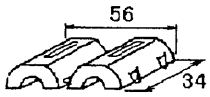
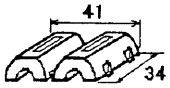
CODE NO.	006-968-480	86AM-X-9408 -4
TYPE	CP86-00501	1/1

工事材料表

INSTALLATION MATERIALS

RS-1000/FRS-1000 ﾚｰﾀﾞｰ・ﾌﾟﾛｯﾀ魚探

RADAR·PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	EMIｺｱ EMI CORE		RFC-10 CODE NO. 000-141-085	1	
2	EMIｺｱ EMI CORE		RFC-5 CODE NO. 000-141-449	1	
3	ｺﾈｸﾀ防御ｼｰﾄ CONNECTOR SHEET		86-012-2055-0 CODE NO. 100-271-370	1	

DWG NO.
C3446-M09- E

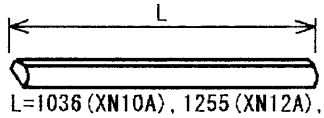
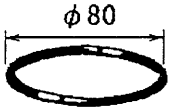
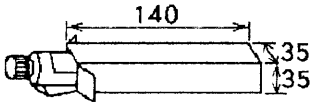
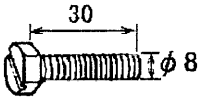
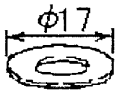
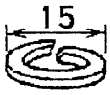
FURUNO ELECTRIC CO . , LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

PACKING LIST

19AK-X-9856 -3 1/1

XN10A, XN12A

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
ｱﾝﾃﾅ ANTENNA	 L=1036(XN10A), 1255(XN12A),	XN10A, 12A 008-523-***	1
ｱﾝﾃﾅ工材 ANTENNA INSTALLATION MATERIALS		CP03-22901	
ｵﾘﾝｸﾞ O-RING		JISB2401-1A-G80 000-851-313	1
ｽﾘｰﾎﾞﾝﾄﾞ SEALANT		1211 50G 000-854-118	1
六角ﾎﾞﾙﾄ ｽﾘﾜﾘ HEX. BOLT		M8X30 SUS304 000-862-151	4
ﾐｶﾞｷ平座金 FLAT WASHER		M8 SUS304 000-864-130	4
バネ座金 SPRING WASHER		M8 SUS304 000-864-262	4

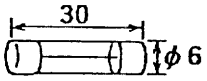
DWG NO.
C3500-Z01- C

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	006-968-030	86AM-X-9301 -1
TYPE	SP86-00401	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	RS-1000/FRS-1000 ﾚｰﾀﾞｰ・ﾌﾟﾛｯﾀ魚探 RADAR PLOTTER SOUNDER		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGBO 15A AC125V	1		1	000-549-014

MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3446-P01- B	1/1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

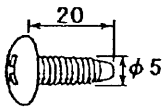
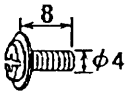
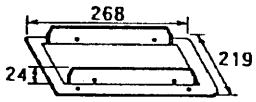
CODE NO.	006-968-050	86AM-X-9501 -2
TYPE	FP86-01100	1/1

付属品表

ACCESSORIES

RS-1000/FRS-1000 ﾚｰﾀﾞｰ・ﾌﾟﾛｯﾀ魚探

RADAR・PLOTTER SOUNDER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾅﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ TAPPING SCREW		5X20 SUS304 1種 CODE NO. 000-802-840	4	
2	ﾅｰﾊﾞｲﾝﾄﾞｾﾑｽF WASHER BINDING HEAD SCREW		M4X8 C2700W CODE NO. 000-806-407	4	
3	取付板 MOUNTING PLATE		86-012-2013-1 CODE NO. 100-264-861	1	

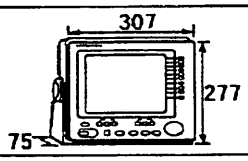
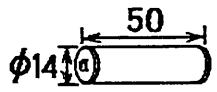
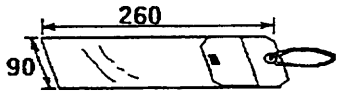
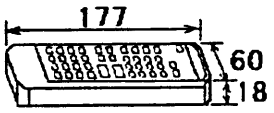
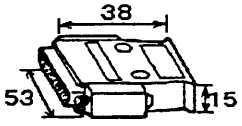
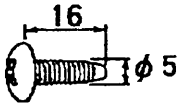
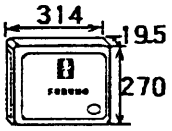
DWG NO.
C3446-F01- C

FURUNO ELECTRIC CO., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

PACKING LIST

RSD-001-J/E

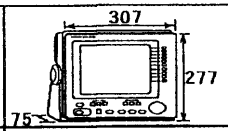
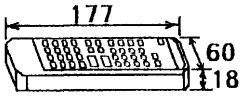
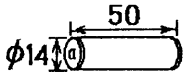
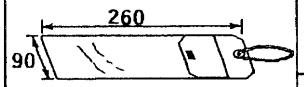
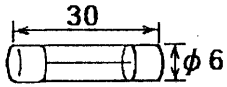
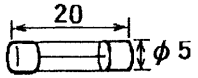
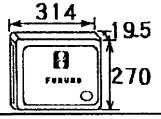
NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
指示器 DISPLAY UNIT		RSD-001-J 000-041-438 **	1
電池 (ﾏﾝｶﾞﾝ) DRY CELL(MANGAN)		R6PSC 000-141-993	2
ﾘﾓｺﾝﾋﾞﾆｰﾙｹｰｽ VINYL CASE FOR REMOTE CONTROLLER		14-034-3002 000-801-746	1
ﾘﾓｺﾝ REMOTE CONTOROLLER		RMC-010-J 006-968-790 **	1
付属品 ACCESSORIES			
ｺﾈｸﾀ組品 CONNECTOR ASSY.		02S4154-1 *B* 000-142-244	1
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ +TAPPING SCREW		5X16 SUS304 1種 000-805-494	4
ﾊｰﾄﾞｶﾊﾞｰ組品 HARD COVER		FP86-01201 006-968-100	1

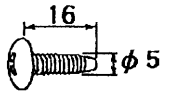
注記) 1.ｺｰﾄﾞ末尾に[**]の付いたﾕﾆｯﾄは代表の型式/ｺｰﾄﾞを表示しています。
DOUBLE ASTERISK DENOTES COMMONLY USED EQUIPMENT.

DWG NO.
C3446-Z01- D

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

PACKING LIST RSD-002-J/E

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
副指示器 SUB-DISPLAY UNIT		RSD-002-J/E 000-041-440**	1
ﾘﾓｺﾝ REMOTE CONTOROLLER		RMC-010-J/E 006-968-790**	1
電池 (ﾏﾝｶﾞﾝ) DRY CELL(MANGAN)		R6PSC 000-141-993	2
ﾘﾓｺﾝﾋﾞﾆｰﾙｹｰｽ VINYL CASE FOR REMOTE CONTROLLER		14-034-3002 000-801-746	1
予備品 SPARE PARTS		SP86-00501	
ﾋｭｰｽﾞ FUSE		FGBO-A 5A AC125V 000-549-064	3
ﾋｭｰｽﾞ FUSE		FGMB 7A 125V 000-105-868	3
付属品 ACCESSORIES		FP86-01201	
ﾊｰﾄﾞｶﾊﾞｰ組品 HARD COVER		FP86-01201 006-968-100	1
付属品 ACCESSORIES		FP86-01202	

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
+ﾄﾗｽﾀｯﾋﾟﾝﾈｼﾞ +TAPPING SCREW		5X16 SUS304 1種 000-805-494	4
その他工材 OTHER INSTALLATION MATERIALS			
ｹｰﾌﾞﾙ組品 CABLE ASSY.		FM-C3FPS001-035 88S0022 000-142-032	1

3.ｺｰﾄﾞ番号末尾の[**]は、選択部品の代表ｺｰﾄﾞ番号を表します。
CODE NUMBER ENDED BY "**" INDICATES THE NUMBER OF TYPICAL MATERIAL.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

DWG NO. C3446 Z02D000

A-15

FURUNO

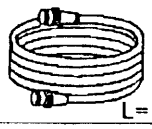
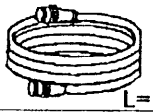
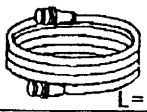
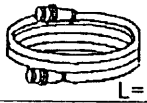
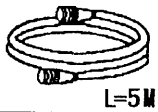
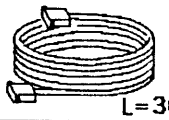
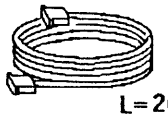
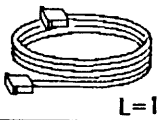
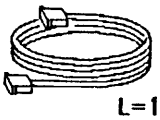
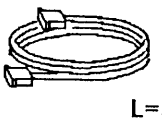
CODE NO.		86AM-X-9411 -1
TYPE		1/2

工事材料表

INSTALLATION MATERIALS

RSD-001/002 指示器/副指示器

DISPLAY/SUB-DISPLAY

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=30M	FM-C10FPD0001-300 CODE NO. 000-142-025	1	選択 TO BE SELECTED
2	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=20M	FM-C10FPD0001-200 88S0024 CODE NO. 000-142-026	1	選択 TO BE SELECTED
3	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=15M	FM-C10FPD0001-150 88S0024 CODE NO. 000-142-027	1	選択 TO BE SELECTED
4	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L= 10M	FM-C10FPD0001-100 88S0024 CODE NO. 000-142-028	1	選択 TO BE SELECTED
5	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=5M	FM-C10FPD0001-050 88S0024 CODE NO. 000-142-029	1	選択 TO BE SELECTED
6	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=30M	02S4146 *30M* CODE NO. 000-141-020	1	選択 TO BE SELECTED
7	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=20M	02S4146 *20M* CODE NO. 000-141-019	1	選択 TO BE SELECTED
8	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=15M	02S4146 *15M* CODE NO. 000-141-018	1	選択 TO BE SELECTED
9	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=10M	02S4146 *10M* CODE NO. 000-141-017	1	選択 TO BE SELECTED
10	ｹｰﾌﾞﾙ(組品) CABLE ASSY.	 L=5M	02S4146 *5M* CODE NO. 000-141-009	1	選択 TO BE SELECTED

DWG NO.
C3446-M12- B

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(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

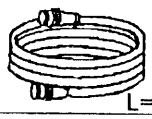
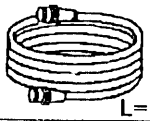
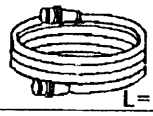
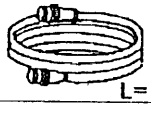
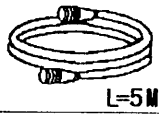
CODE NO.		86AM-X-9411 -1
TYPE		2/2

工事材料表

INSTALLATION MATERIALS

RSD-001/002 指示器/副指示器

DISPLAY/SUB-DISPLAY

番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS		数量 Q'TY	用途/備考 REMARKS
11	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=20M	MJ-A10SPF0002-200 02S4153		1	国内選択 TO BE SELECTED
			CODE NO.	000-141-960		
12	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=30M	20S0189 *30M*		1	国内選択 TO BE SELECTED
			CODE NO.	000-129-013		
13	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=15M	MJ-A10SPF0002-150 20S0181		1	国内選択 TO BE SELECTED
			CODE NO.	000-129-012		
14	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L= 10M	MJ-A10SPF0002-100 64S4050		1	国内選択 TO BE SELECTED
			CODE NO.	000-126-659		
15	ｹｰﾌﾞﾙ組品 CABLE ASSY.	 L=5M	MJ-A10SPF0002-050 64S4063		1	国内選択 TO BE SELECTED
			CODE NO.	000-131-411		

DWG NO.
C3446-M13- B

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(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

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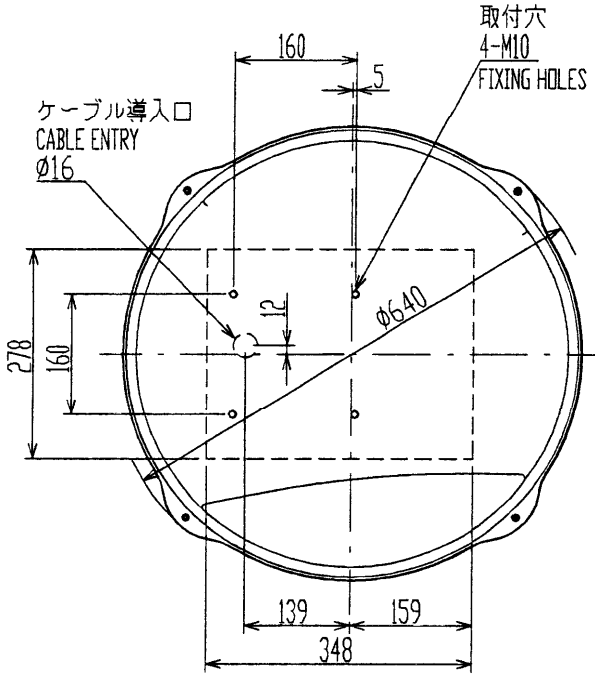
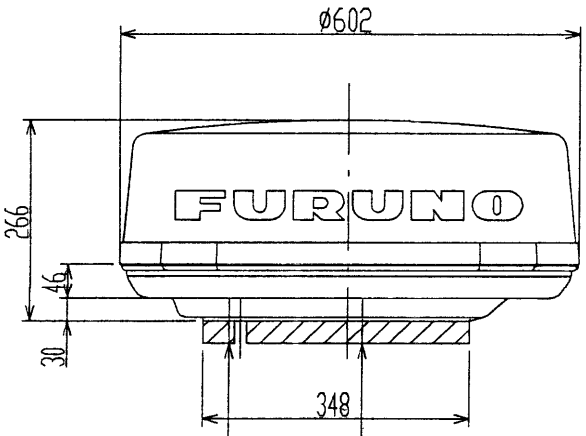
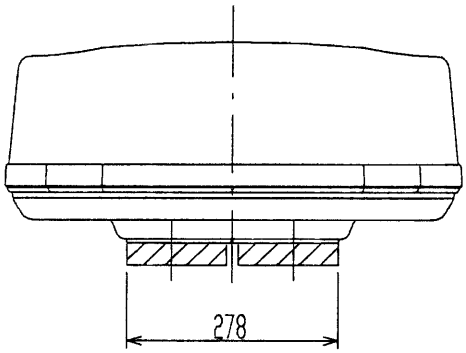
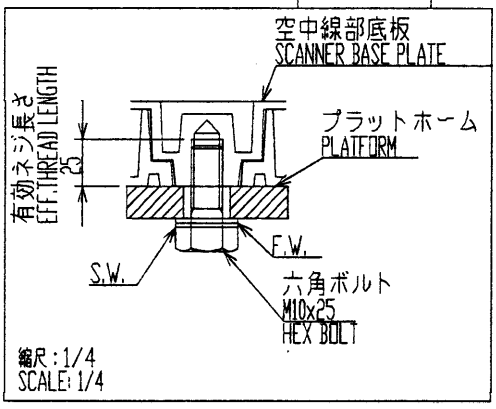
表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3
500 < L ≦ 1000	±4









注記
1）指定外の寸法公差は表1による。
TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2）コンパス安全距離
COMPASS SAFE DISTANCE.

スタンダード STANDARD	1.4 m
ステアリング STEERING	1.1 m

DRAWN Sep. 21 '01 T.YAMASAKI			TITLE RSB-0071
CHECKED Sep. 21 '01 Y.K.	MODEL 1833/1833C MODEL 1732/1732C		名称 空中線部
APPROVED Sep. 21 '01 Y.K.	RS-1000 MODEL 1832		外寸図
SCALE 1/10	MASS 8 ±10% kg		NAME SCANNER UNIT
DWG.No. C3441-G01-E	03-136-6001-G2		OUTLINE DRAWING

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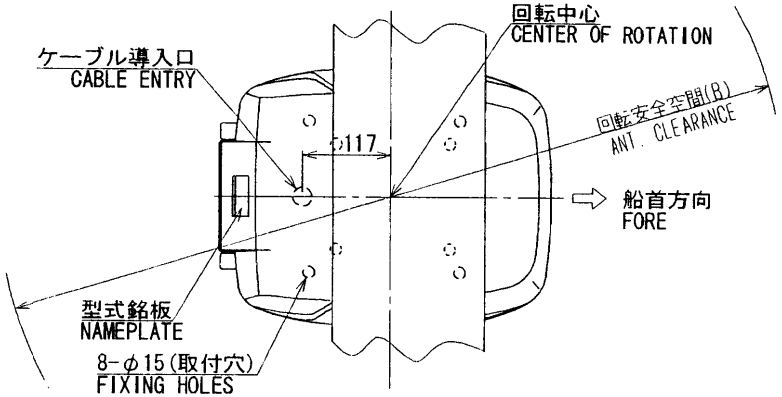
FURUNO



注記
1) 取付はM12ボルトを使用のこと。
2) 指定外寸法公差は表1による。
3) 空中線部の取付台にφ25-30のケーブル貫通穴を開ける。
4) 初期製造分は取付穴寸法240x240で出荷しております。
換装時に注意してください。

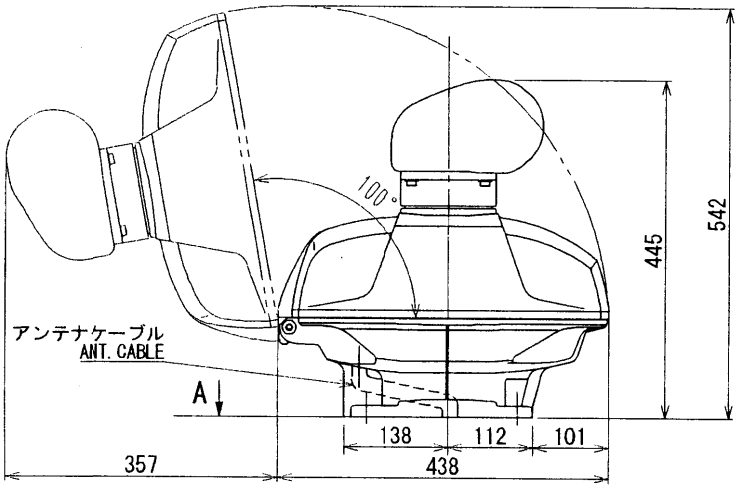
NOTE
1. USE M12 BOLTS FOR FIXING UNIT.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. MAKE A HOLE φ25-30 ON MOUNTING MAST FOR CABLE ENTRY.
4. NOTE FOR REPLACEMENT: FIXING HOLE DIMENSIONS ARE CHANGED FROM 240x240 OF PREVIOUS SETS TO 200x200.

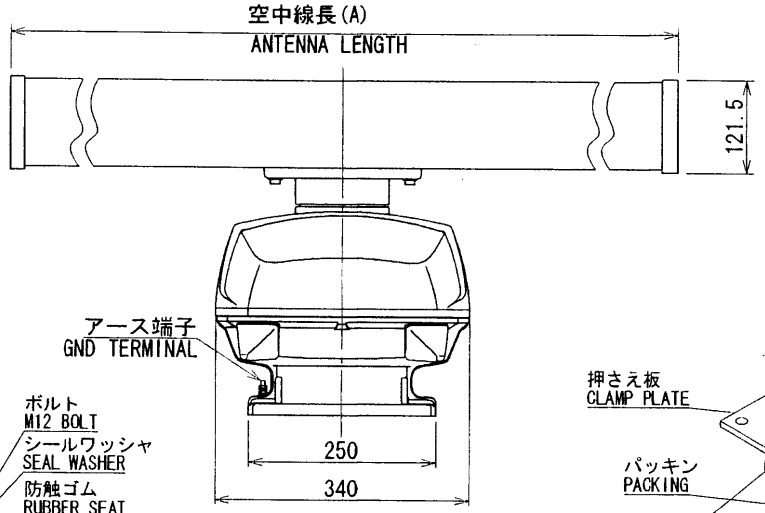
寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
0<L≦50	±1.5mm
50<L≦100	±2.5mm
100<L≦500	±3mm
500<L≦1000	±4mm
1000<L≦2000	±5mm

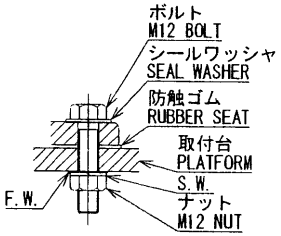
表1 TABLE 1

種類 TYPE	XN12A	XN13A
空中線長(A) LENGTH (mm)	1255±10	1795±10
安全空間(B) CLEARANCE (mm)	1400	1940
質量 (kg) MASS	23	25

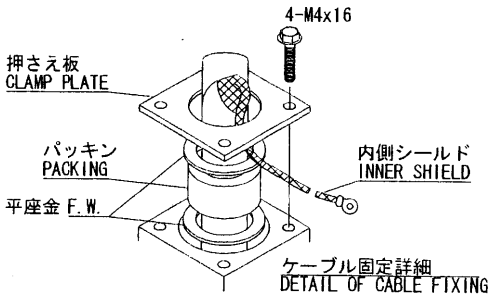
表2 TABLE 2



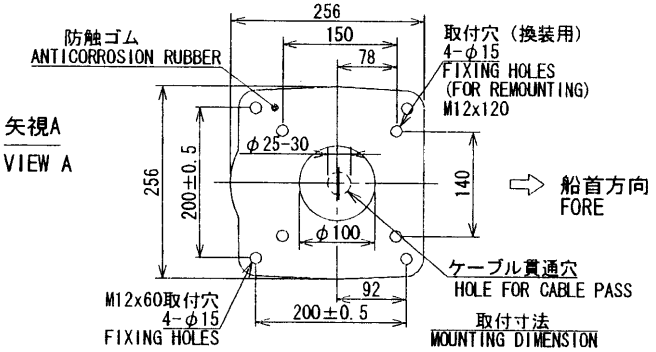




取付け部詳細
DETAIL OF UNIT FIXING



ケーブル固定詳細
DETAIL OF CABLE FIXING



DRAWN July 11'00 T.YAMASAKI			TITLE RSB-0070/0072/0073 (XN12A/13A)
CHECKED July 11'00	FR-7041R M2 FRS/RS-1000C		名称 空中線部
APPROVED July 11'00	MODEL1942M2 FR-7062/7112/7252		外寸図
SCALE 1/10	MASS 表2に記載 SEE TABLE 2		NAME ANTENNA UNIT
DWG. No. C3459-G03- C	03-142-3000-G3		OUTLINE DRAWING

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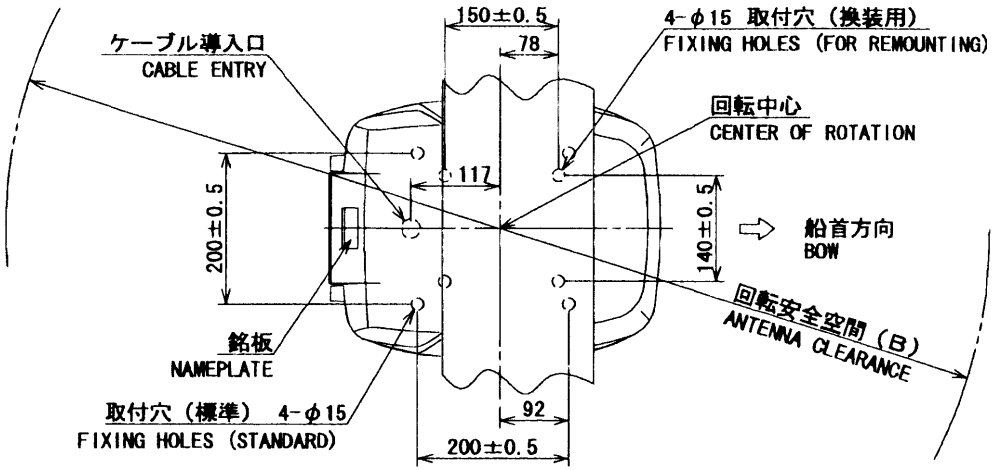


注 記

1） 取付はM12ボルトを使用のこと。
2） 指定外寸法公差は表２による。
3） 本機取付台にφ25-30のケーブル貫通穴を開ける。

NOTE

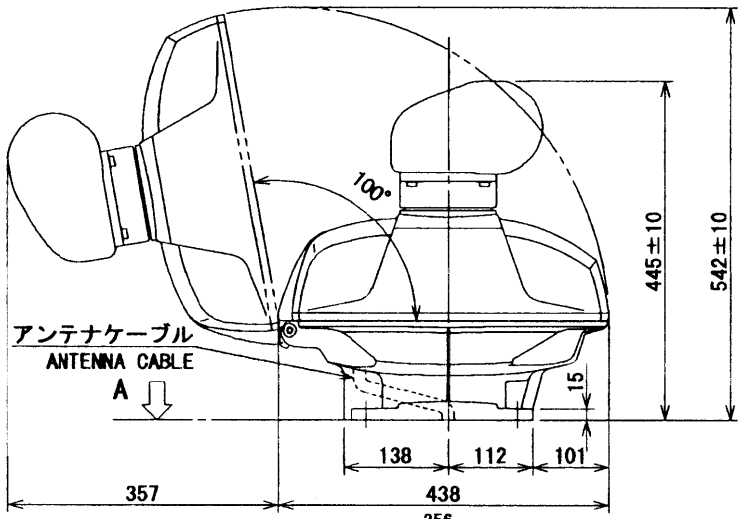
1. USE M12 BOLTS FOR FIXING THE UNIT.
2. TABLE 2 INDICATES TOLERANCE OF DIMENSIONS.
3. MAKE A HOLE φ25-30 ON MOUNTING MAST FOR CABLE PASS.

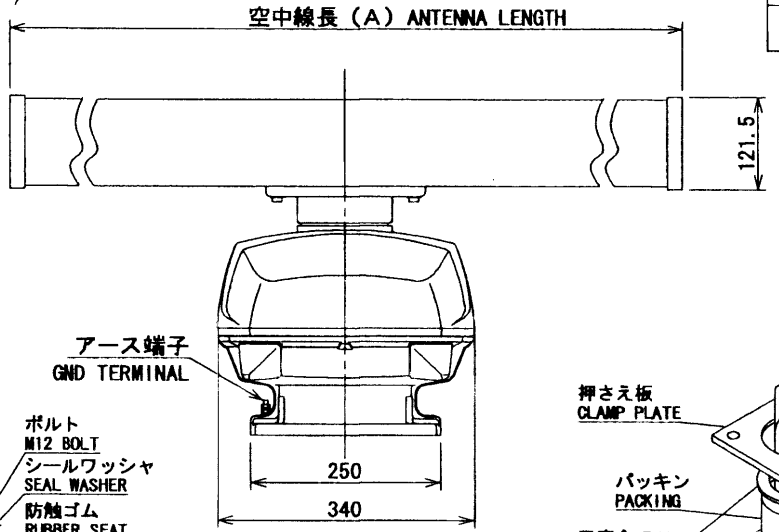
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3
500<L≦1000	±4
1000<L≦2000	±5

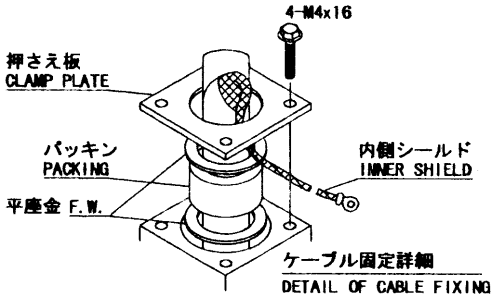
表 2 TABLE 2

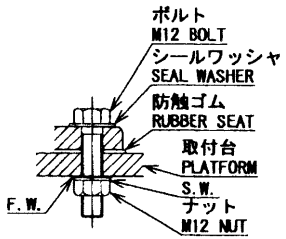
種 類 TYPE	XN10A	XN12A
空中線長(A) LENGTH (mm)	1036±10	1255±10
回転安全空間(B) CLEARANCE (mm)	1200	1400
質 量 (kg) MASS (±10%)	22	23

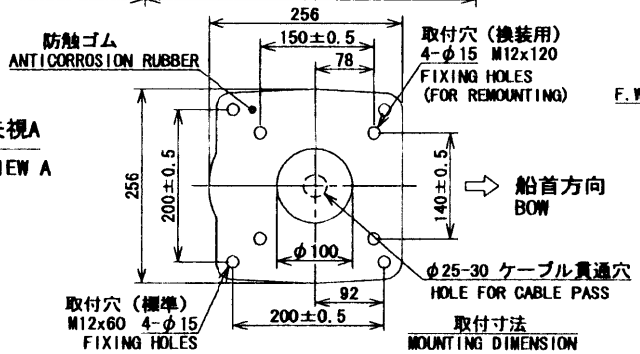
表 1 TABLE 1











DRAWN Feb. 1 '01 T. YAMASAKI			TITLE RSB-0070/0073
CHECKED Feb 2 '01 S. K.			名称 空中線部
APPROVED Feb 5 '01 S. Fukimura	MODEL 1933 MODEL 1762/C		外寸図
SCALE 1/10	MASS 表2参照 SEE TABLE 2		NAME ANTENNA UNIT
DWG. No. C3500-G01- A	03-153-300G-0		OUTLINE DRAWING

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D - 2A

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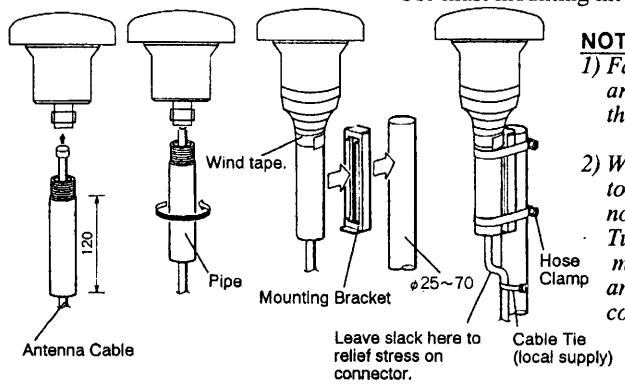
A) Mast mounting

Use mast mounting kit CP20-01111.



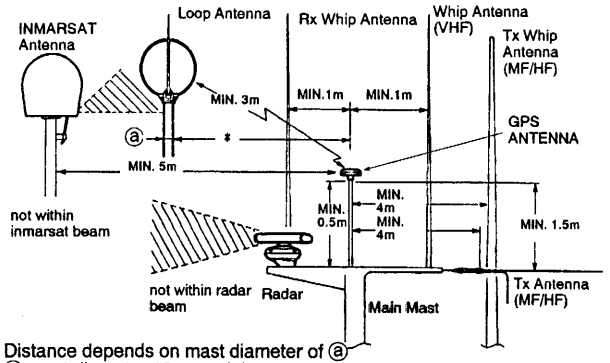
NOTES

1) Fasten pipe to antenna first then fix them to mast.

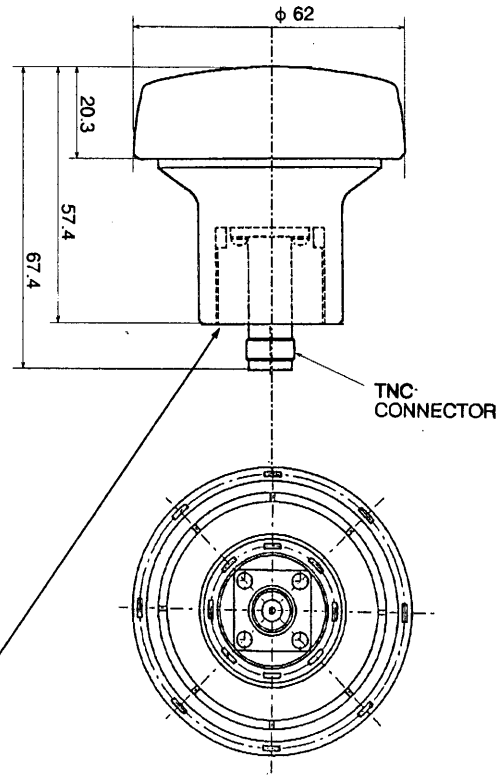
2) When fixing antenna to pipe, turn pipe; not the antenna. Turning the antenna may twist the cable and place stress on connector.

Mounting location

The figure below shows the recommended separation distances from other antennas to avoid mutual interference.

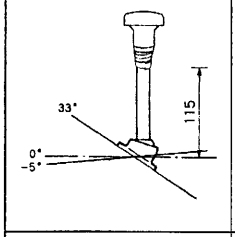
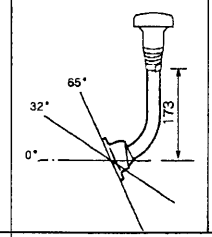
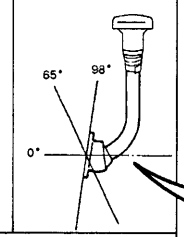


* Distance depends on mast diameter of ⓐ
ⓐ mast diameter 10cm : minimum 1.5m
ⓐ mast diameter 30cm : minimum 3m

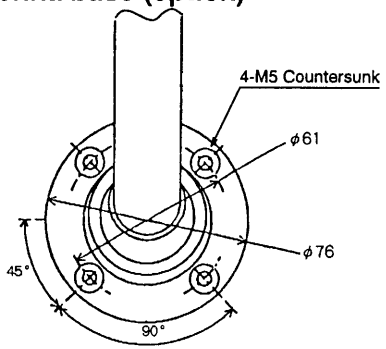


B) Antenna base mounting

Use optional antenna base No.13-QA300 or No.13-QA310.

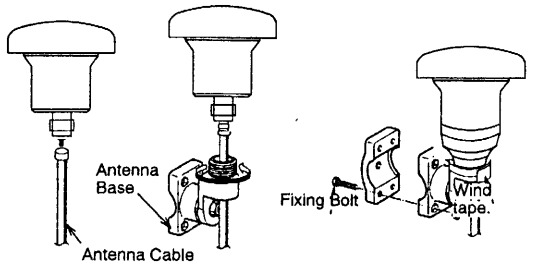
Inclination -5° to 33°	32° to 65°	65° to 98°
		
Right angle antenna base No.13-QA330 (code No. 000-803-239)	L-type antenna base No.13-QA310 (code No. 000-803-240)	

Mounting dimensions of antenna base (option)



Thread Type	Threads per 25.4 mm (1 inch)	Pitch	Thread Length	Pitch Diameter
1 × 14UNS1B	14	1.8143 mm	15.17 mm	24.17 mm

C) Handrail mounting



Use handrail mounting base No.13-RC5160 (Code No. 000-861-114, option). The diameter of the handrail may be from ϕ19mm to ϕ32mm.

NOTES

1) Fasten antenna base to antenna first then fix them to handrail.

2) When fixing antenna to antenna base, turn antenna base; not the antenna. Turning the antenna may twist the cable and place stress on connector.

DRAWN Nov 20'98 T.YAMASAKI	GP-50MK3 PS-8000M2 GP-1600/F GP-8000M2 GP-3100M2 GP-80		TYPE GPA-016
CHECKED Nov.24'98 K.KUSUNOKI			名称 空中線部
APPROVED Nov.24'98 K.KUSUNOKI			外寸図
SCALE 1/1	MASS 0.1 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME ANTENNA UNIT
DWG NO. E4374-G04- F				OUTLINE DRAWING

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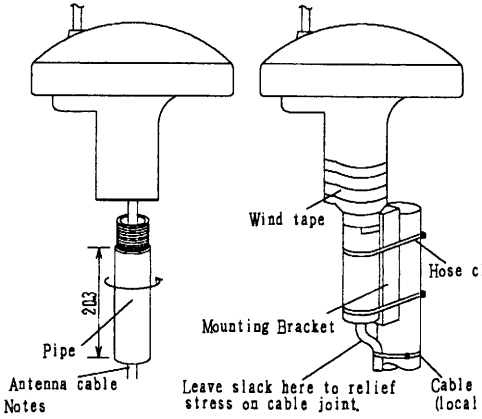
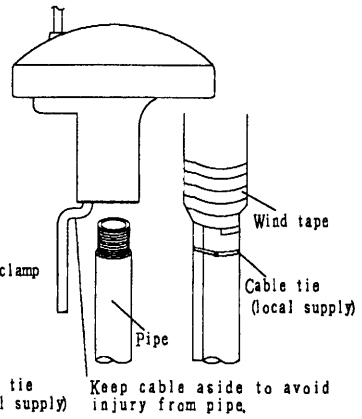
A) Mast mounting

a) Use mast mounting kit CP20-01111.



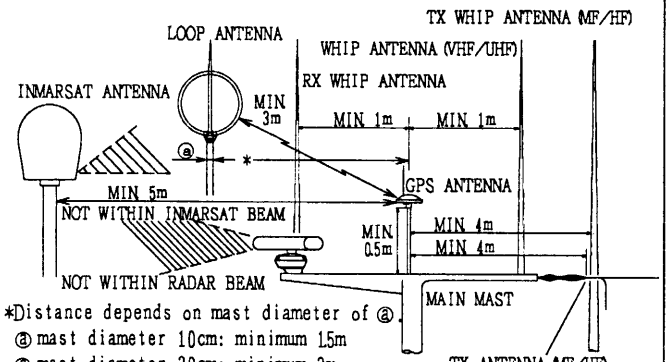
b) Use a pipe only.



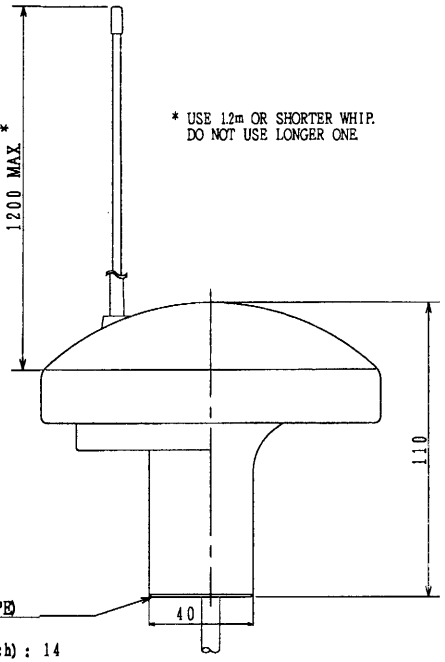
Notes
1) Fasten pipe to antenna first then fix them to mast.
2) When fixing antenna to pipe, turn pipe; not the antenna
Turning the antenna may twist the cable and place stress on connector.

Mounting location

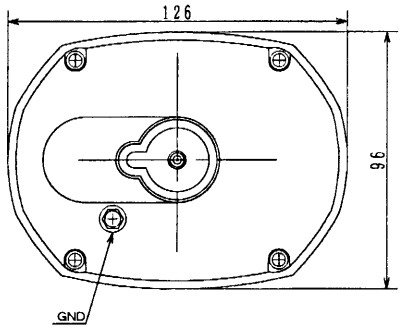
The figure below shows the recommended separation distance from antennas to avoid mutual interference.



*Distance depends on mast diameter of ⓐ.
ⓐ mast diameter 10cm: minimum 1.5m
ⓐ mast diameter 30cm: minimum 3m

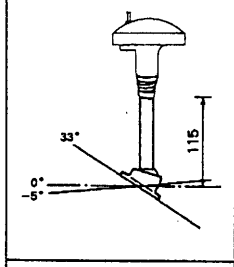
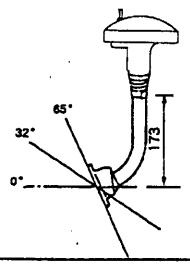
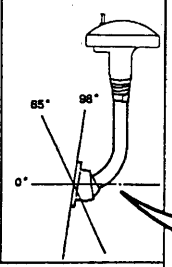


THREAD DIMENSION (for PIPE)
Thread Type: 1x14UNS1B
Threads per 25.4 mm (1 inch) : 14
Pitch: 1.8143 mm
Thread Length: 19 mm or more
Pitch Diameter: 24.17 mm

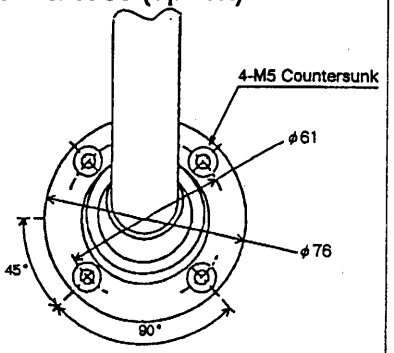


B) Antenna base mounting

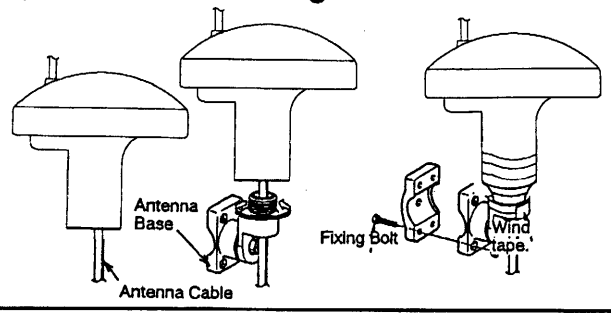
Use optional antenna base No.13-QA300 or No.13-QA310.

Inclination -5° to 33°	32° to 65°	65° to 98°
		
Right angle antenna base No.13-QA330 (code No. 000-803-239)	L-type antenna base No.13-QA310 (code No. 000-803-240)	

Mounting dimensions of antenna base (option)



C) Handrail mounting



Use handrail mounting base No.13-RC5160 (Code No. 000-861-114, option). The diameter of the handrail may be from ϕ19mm to ϕ32mm.

NOTES

1) Fasten antenna base to antenna first then fix them to handrail.

2) When fixing antenna to antenna base, turn antenna base; not the antenna. Turning the antenna may twist the cable and place stress on connector.

GPA-018: W/ 10m CABLE
GPA-018S: W/ 0.2m CABLE

DRAWN Nov 20'98 T.YAMASAKI				TYPE GPA-018/018S
CHECKED Nov 24'98 K.KUSUNOKI				名称 空中線部
APPROVED Nov 24'98 K.KUSUNOKI		FRS-1000 GP-35		外寸図
SCALE /	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME ANTENNA UNIT
DWG NO. E4385-G01- E				OUTLINE DRAWING

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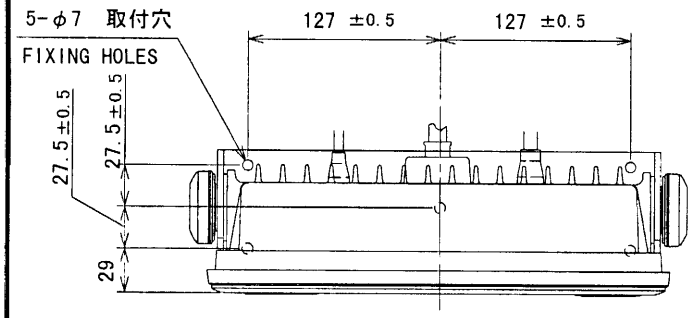
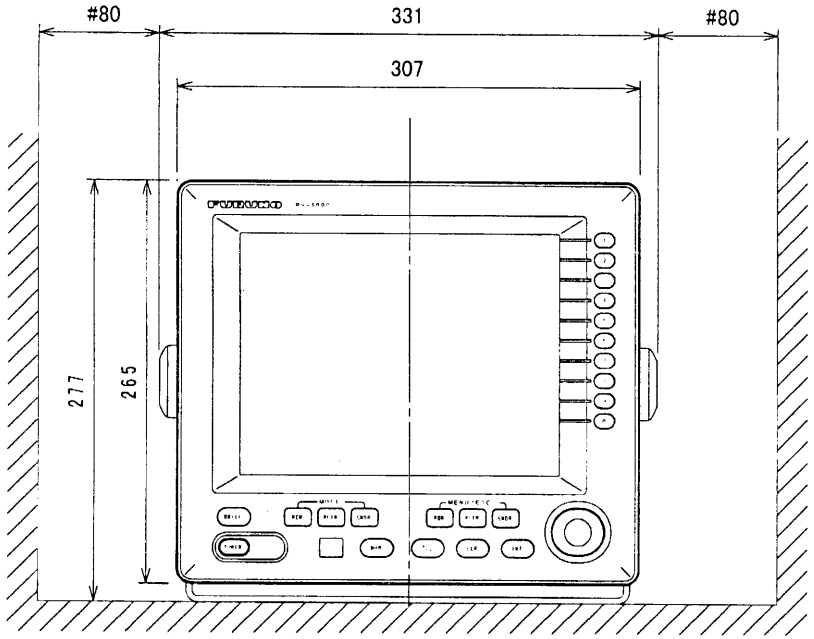
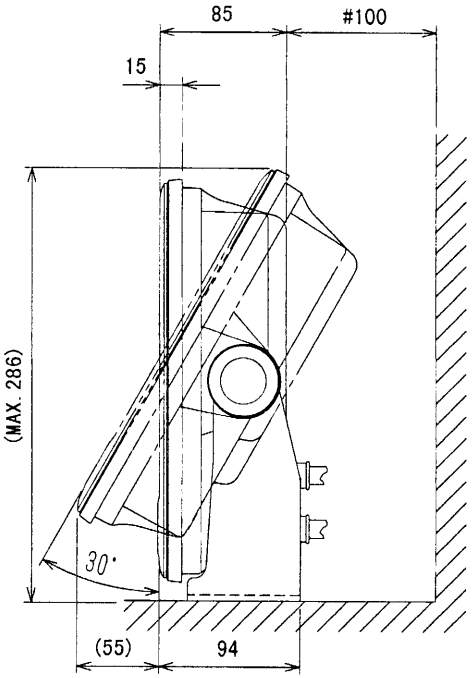
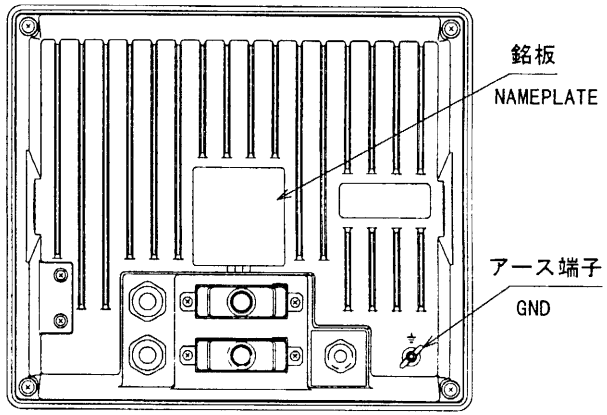


範 囲 DIMENSION	公差 TOL.
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm

表 1
TABLE 1







注 記

1）指定外寸法公差は表1による。
2）#：推奨するサービス空間寸法。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.

DRAWN Nov.12'98 T.YAMASAKI		TITLE	RSD-001
CHECKED Nov.12'98 K.Kusunoki		名称	指示器（ハンガータイプ）
APPROVED Nov.12'98 K.Kusunoki	RS-1000/FRS-1000		外寸図
SCALE 1/5 MASS 4.0 kg		NAME	LCD MONITOR W/ HANGER
DWG. No. C3446-G01- B	86-012-1000-G2		OUTLINE DRAWING

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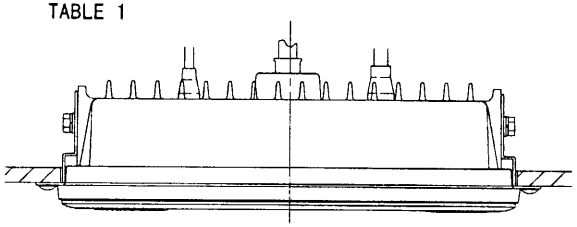
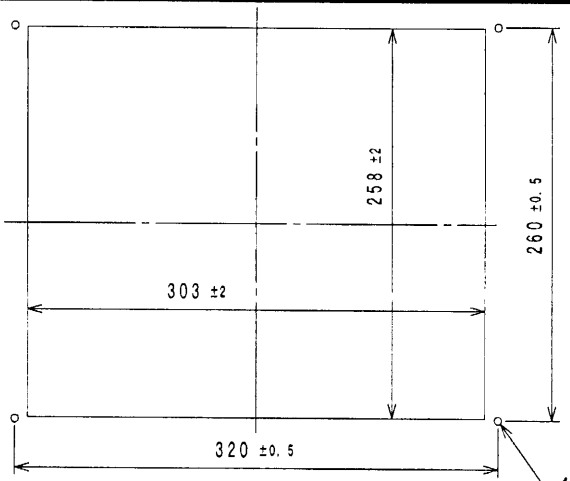
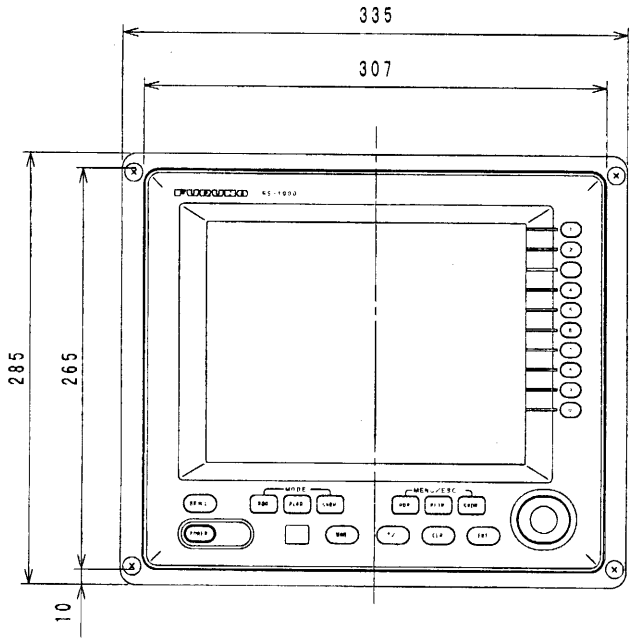
範　囲 DIMENSION	公差 TOL.
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm

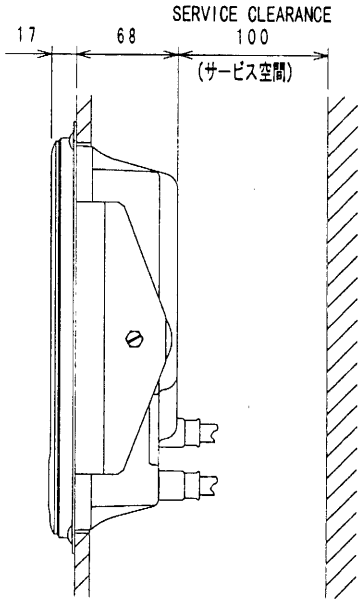
表　1
TABLE 1

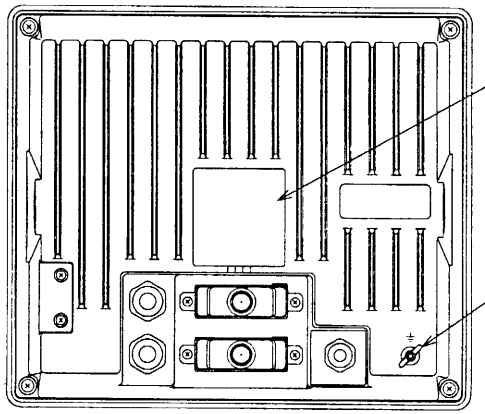




取付穴寸法図
CUTTING DIMENSIONS







注　記
1) 指定外寸法公差は表１による

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Nov.12'98 T.YAMASAKI		TITLE	RSD-001
CHECKED NOV 12'98 K.Kusunoki		名称	指示器（フラッシュマウント）
APPROVED NOV.12'98 K.Kusunoki	RS-1000/FRS-1000		外寸図
SCALE 1/5 MASS 4.1 kg		NAME	LCD MONITOR (FLASH MOUNT)
DWG. No. C3446-G02- B	86-012-1100-G1		INTERCONNECTION DIAGRAM

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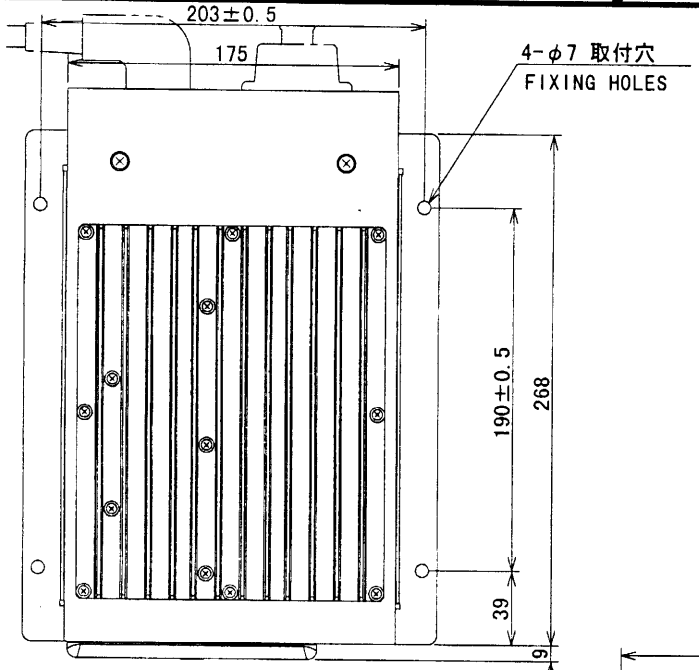
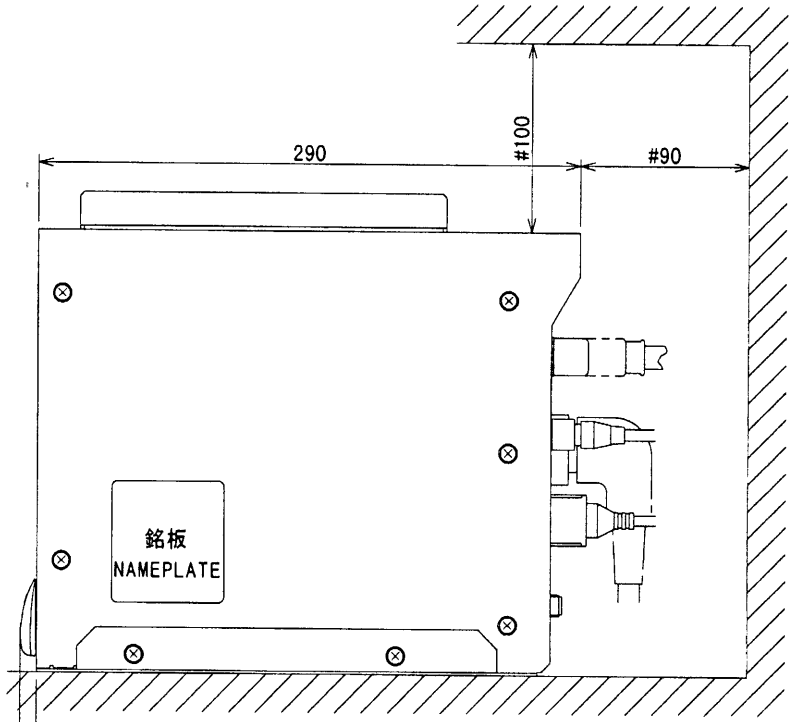


注 記
1）指定外の寸法公差は表1による。
2）＃：推奨する最小サービス空間寸法。

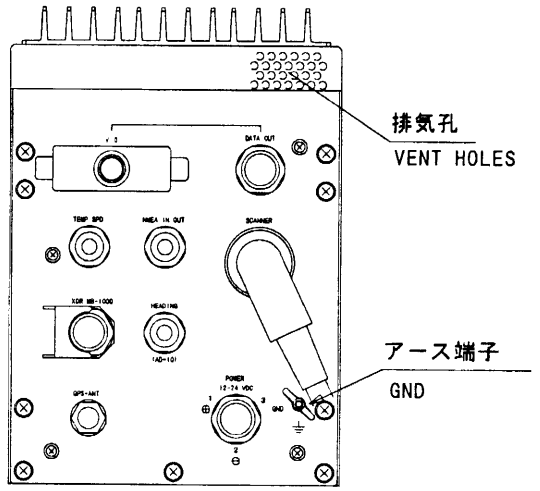
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.

範 囲 DIMENSION	公差 TOL.
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm

表1 TABLE 1



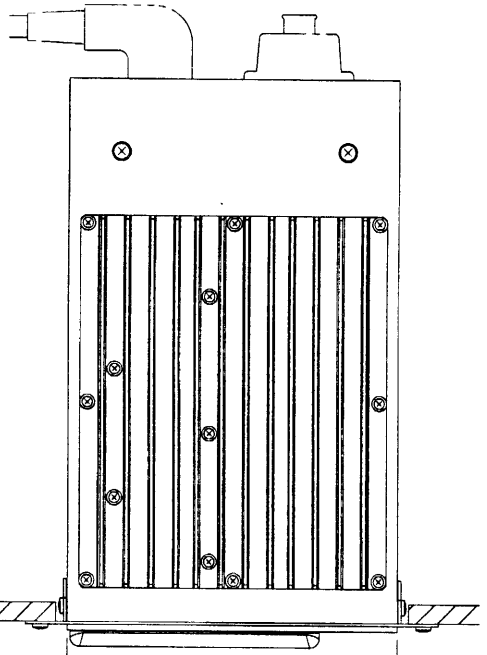
背面パネル図
REAR VIEW

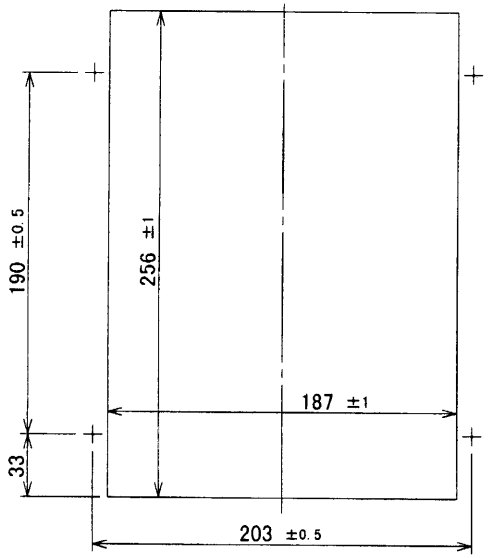


DRAWN Oct 14'98 T.YAMASAKI		TITLE	RSM-001
CHECKED Oct 14'98 K.KUSUNOKI		名称	信号処理部（卓上装備）
APPROVED Oct 14'98 K.KUSUNOKI	FRS-1000(Int'l) RS-1000		外寸図
SCALE 1/4 MASS 6 kg		NAME	PROCESSER UNIT (DESKTOP MOUNT)
DWG. No. C3446-G03- A	86-012-2000-G3		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO





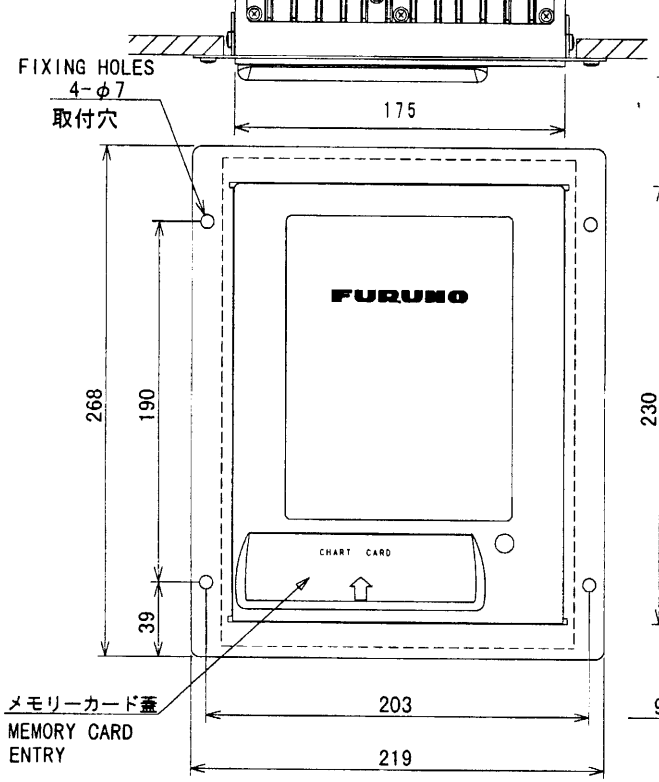
取付穴寸法図
CUTTING DIMENSION

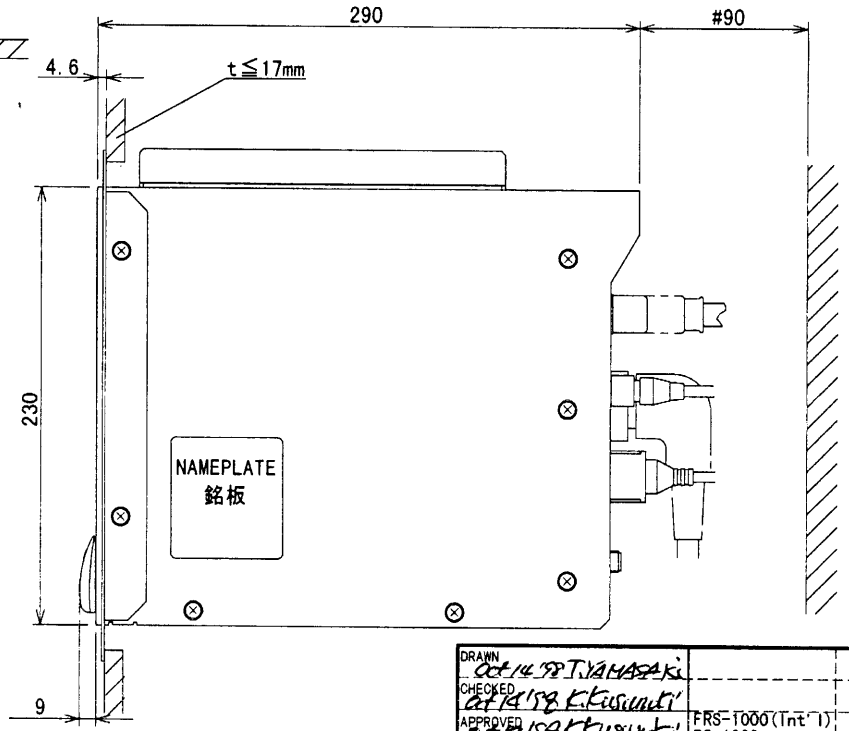
範　囲 DIMENSION	公差 TOL.
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm

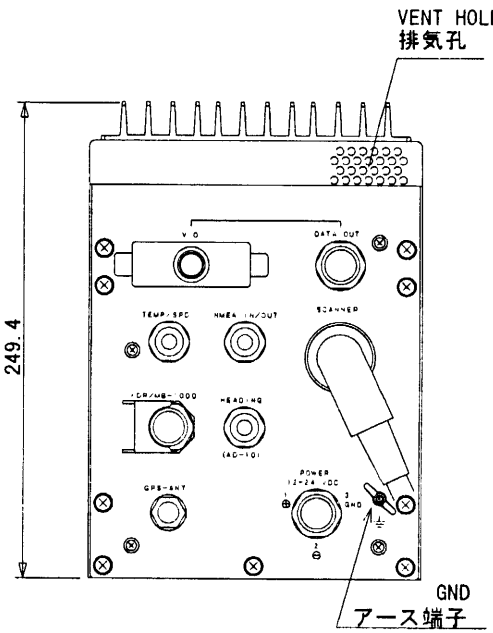
表1 TABLE 1

注　記
1）指定外寸法公差は表1による。
2）＃：推奨するサービス空間寸法。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.







DRAWN Oct/14/98 T.YAMASAKI		TITLE	RSM-001
CHECKED Oct/14/98 K.Kusunoki		名称	信号処理部(埋込装備)
APPROVED Oct/14/98 K.Kusunoki	FRS-1000(Int'l) RS-1000		外寸図
SCALE 1/4 MASS 6 kg		NAME	PROCESSOR UNIT (FLASH MOUNT)
DWG. No. C3446-G04- A	86-012-2100-G2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

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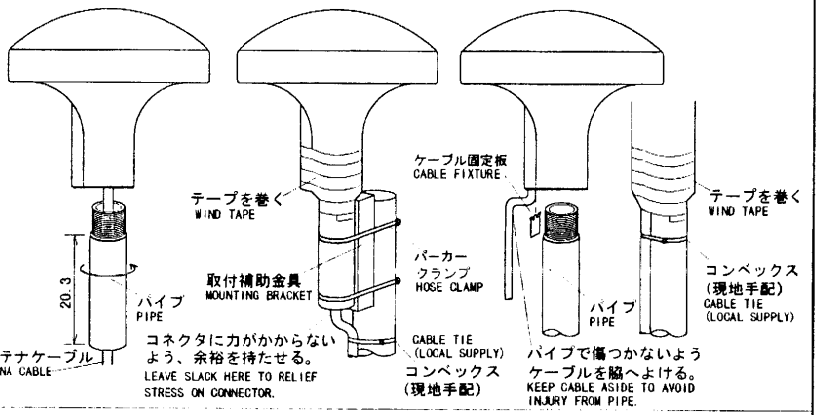
A) マストへの取付け　MAST MOUNTING

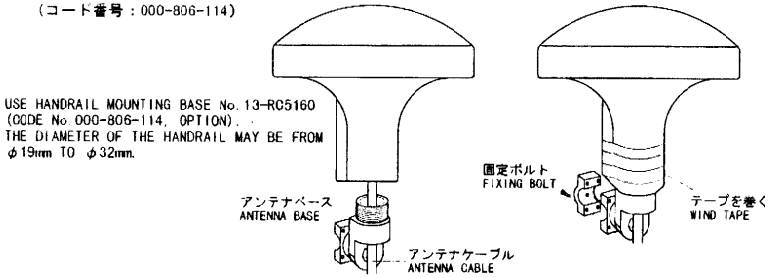
a) マスト取付金具CP20-01111(工事材料)でマストに固定する。
USE MAST MOUNTING KIT CP20-01111.

b) パイプのみを使うとき
USE A PIPE ONLY.



B) スタンションやパルピットにつけるとき　HANDRAIL MOUNTING

レール用アンテナベース No. 13-RC5160 (取付可能レール直径：φ19～φ32)
(コード番号：000-806-114)

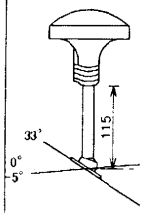
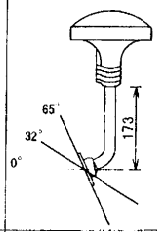
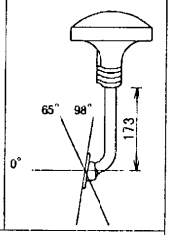


注記 1) パイプ(アンテナベース)はアンテナユニットにねじ込んだ後に固定する。
2) アンテナを固定するときはパイプ（アンテナベース）をアンテナにねじ込むこと。
アンテナ側をねじるとコネクタ部やケーブルに無理がかかり、故障の原因となる。

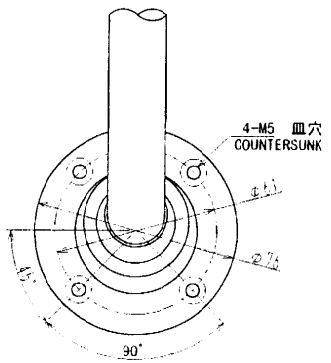
NOTE 1. FASTEN PIPE(ANTENNA BASE) TO ANTENNA UNIT FIRST THEN FIX THEM TO MAST OR HANDRAIL.
2. WHEN FIXING ANTENNA, TURN PIPE OR ANTENNA BASE; NOT THE ANTENNA.
TURNING THE ANTENNA MAY TWIST THE CABLE AND PLACE STRESS ON CONNECTOR.

C) 取付ける場所が傾斜しているとき　ANTENNA BASE MOUNTING

オプションのアンテナベースを使う。
USE OPTIONAL ANTENNA BASE No. 13-QA330/QA310.

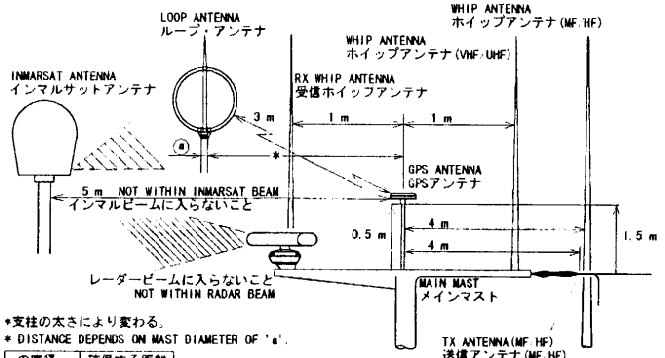
傾斜 INCLINATION	-5° - 33°	32° - 65°	65° - 98°
装備方法 MOUNTING METHOD			
アンテナベース型式 ANTENNA BASE TYPE	直型アンテナベース RIGHT ANGLE ANTENNA BASE No. 13-QA330	L型アンテナベース L-TYPE ANTENNA BASE No. 13-QA310	
コード番号 CODE No.	000-803-239	000-803-240	

アンテナベース基部
MOUNTING DIMENSIONS OF ANTENNA BASE



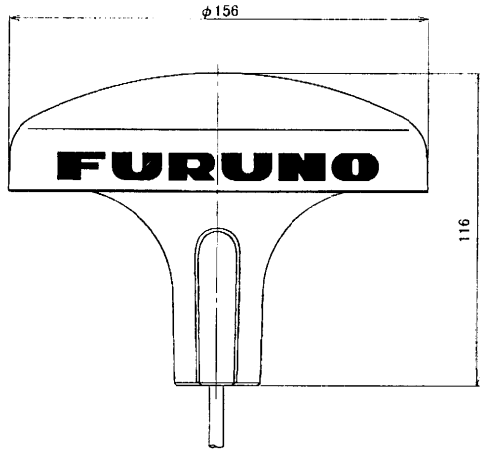
取付場所 MOUNTING LOCATION

THE FIGURE BELOW SHOWS THE RECOMMENDED SEPARATION DISTANCES FROM OTHER ANTENNAS TO AVOID MUTUAL INTERFERENCE.
他の機器のアンテナから下の図の距離以上離す。



*支柱の太さにより変わる。
* DISTANCE DEPENDS ON MAST DIAMETER OF 'a'.

aの直径 DIA. OF 'a'	確保する距離 DISTANCE MIN.
10 cm	1.5 m
30 cm	3 m

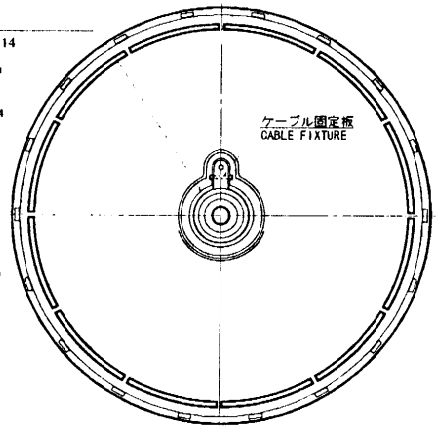


寸法区分(mm) DIMENSION	公差(mm) TOL.
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

表 1　TABLE 1

1-14UNS1B
ねじ山数(25.4mmにつき)：14
ピッチ：1.8143 mm
オネジ有効長さ：15.17 mm
オネジ有効径：24.17 mm

THREAD PER 25.4mm 1 INCH : 14
PITCH: 1.8143 mm
THREAD LENGTH 15.17 mm
PITCH DIAMETER 24.17 mm



注記：　指定外の寸法公差は表1による

NOTE: TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量 (kg) MASS
GPA-019	10	TNC-P-3	1.0
GPA-019S	0.2	TNC-J-3	0.54

表 2　TABLE 2

DRAWN	May 26 '99 T.YAMASAKI		TITLE GPA-019/019S
CHECKED	May 26 '99 K.Kusunoki		名称 空中線部
APPROVED	May 26 '99 K.Kusunoki		外寸図
SCALE 1/2	MASS TABLE 2 表2参照		NAME ANTENNA UNIT
DWG. No.	C4400-G01- C		OUTLINE DRAWING

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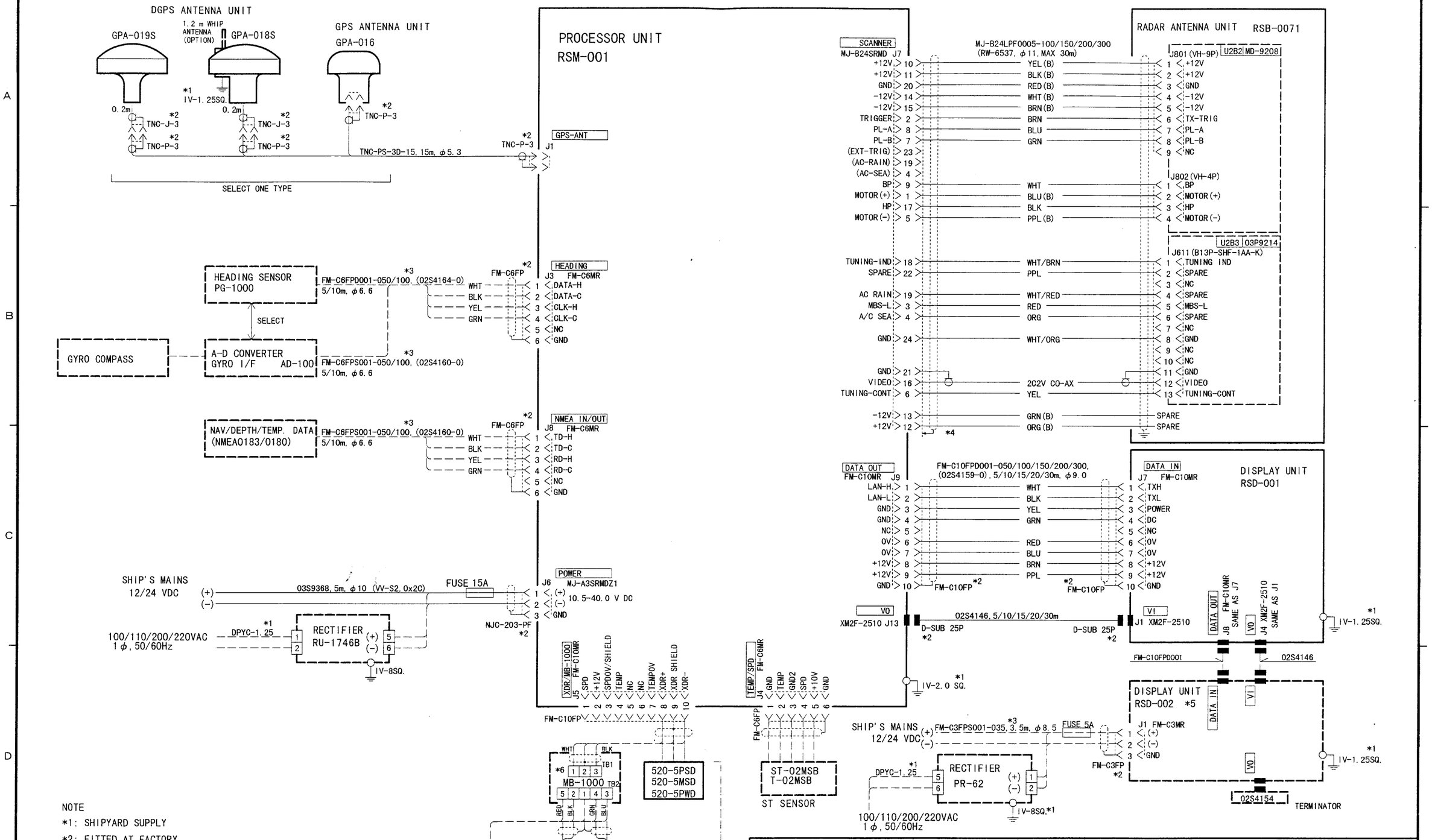

NOTE
*1: SHIPYARD SUPPLY
*2: FITTED AT FACTORY.
*3: OPTION
*4: GROUND THRU CONNECTOR CLAMP.
*5: TWO SLAVE DISPLAYS ARE CONNECTABLE.
TOTAL CABLE LENGTH BETWEEN PROCESSOR UNIT AND TERMINATOR: 30 m MAX.
*6: DISTRIBUTOR MB-1000 REQUIRED FOR 1 KW TRANSDUCER.

DRAWN	Dec 17'99 T. YAMASAKI	TITLE	FRS-1000 A
CHECKED	Dec 20'99 K. Kusunoki	NAME	RADAR PLOTTER SOUNDER
APPROVED	Dec 20'99 K. Kusunoki		INTERCONNECTION DIAGRAM
SCALE	MASS kg		
DWG No.	E3446-C01- J		

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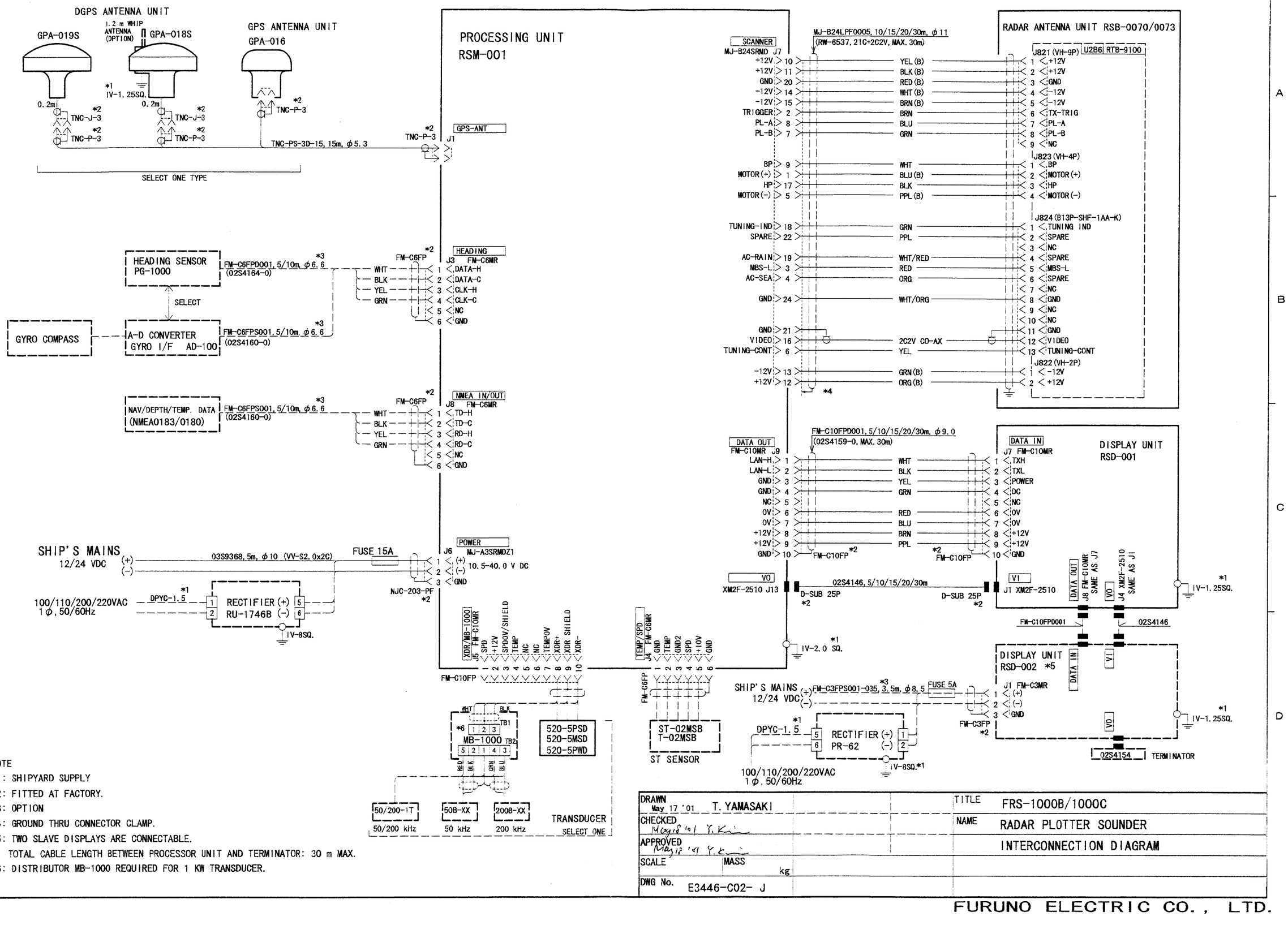

NOTE
*1: SHIPYARD SUPPLY
*2: FITTED AT FACTORY.
*3: OPTION
*4: GROUND THRU CONNECTOR CLAMP.
*5: TWO SLAVE DISPLAYS ARE CONNECTABLE.
TOTAL CABLE LENGTH BETWEEN PROCESSOR UNIT AND TERMINATOR: 30 m MAX.
*6: DISTRIBUTOR MB-1000 REQUIRED FOR 1 KW TRANSDUCER.

DRAWN	May 17 '01 T. YAMASAKI	TITLE	FRS-1000B/1000C
CHECKED	May 18 '01 Y.K	NAME	RADAR PLOTTER SOUNDER
APPROVED	May 18 '01 Y.K		INTERCONNECTION DIAGRAM
SCALE	MASS kg		
DWG No.	E3446-C02- J		

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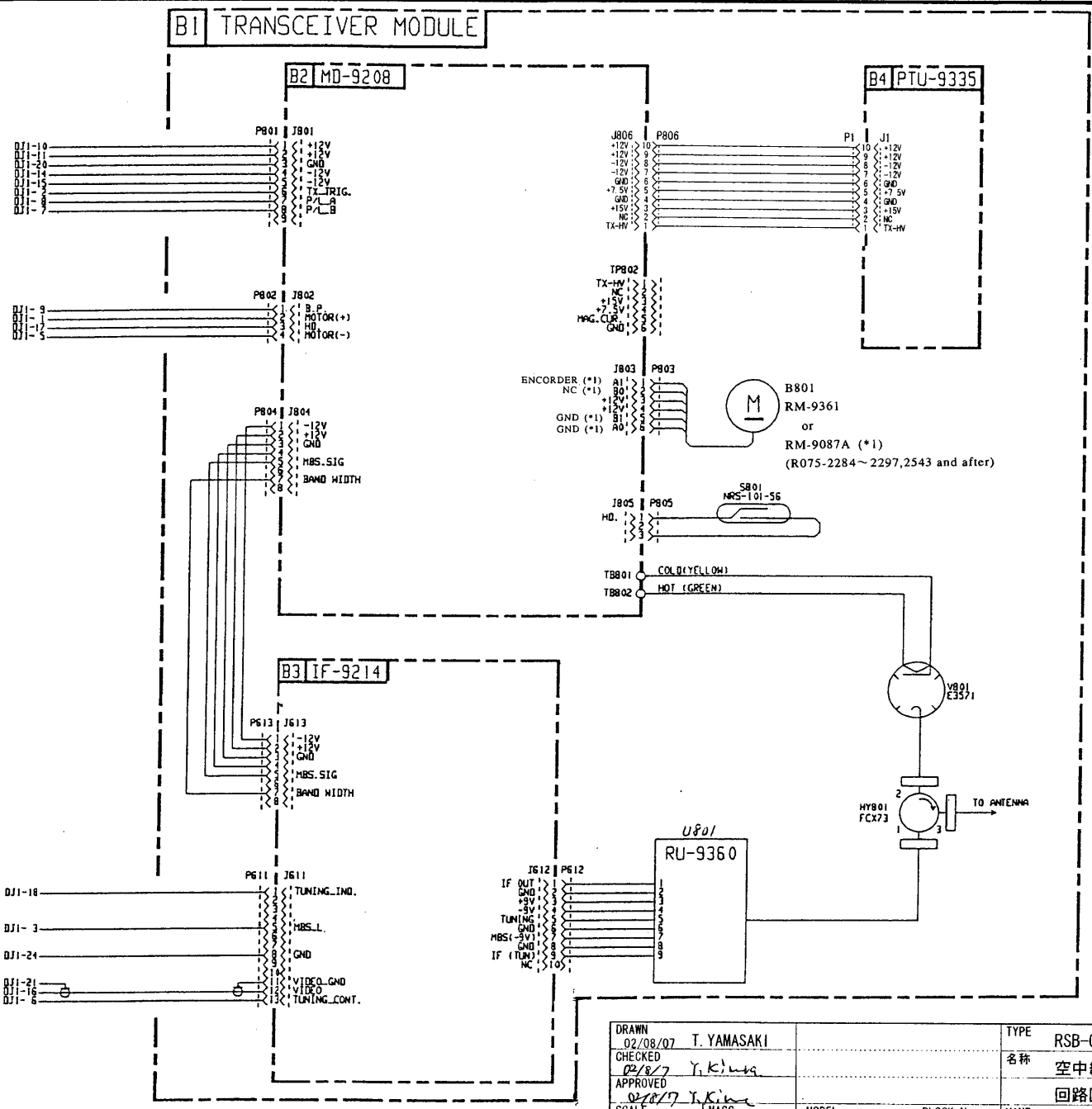

DRAWN 02/08/07 T. YAMASAKI			TYPE RSB-0071
CHECKED 02/8/7 Y.Kimura			名称 空中線部
APPROVED 02/8/7 T.Kimura			回路図
SCALE	MASS	MODEL BLOCK No.	NAME SCANNER UNIT
Dwg No. C3441-K06- C		03-136-6005-1	SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

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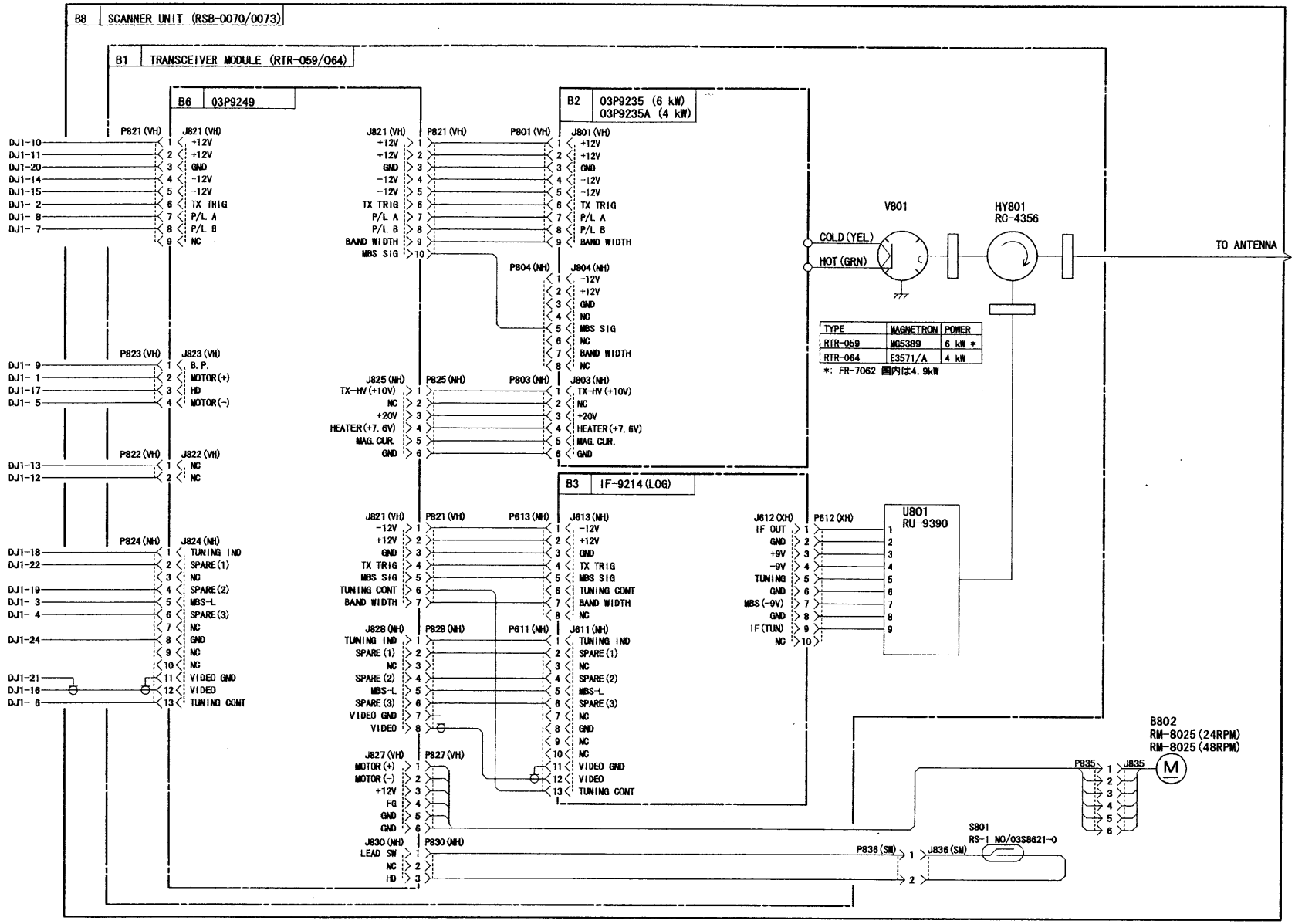
FURUNO



DRAWN May 17 '01 T. YAMASAKI		TITLE	RSB-0070/0073-059/064
CHECKED May/17 '01 Y.K	FRS-1000B/C, RS-1000C MODEL1933/1933C	名称	空中線部（総合）
APPROVED May/17 '01 Y.K	MODEL1932M2/1942M2 FR-7062		回路図
SCALE	MASS kg	NAME	SCANNER UNIT (GENERAL)
DWG No. C3459-K02- F	03-142-6009-3		SCHEMATIC DIAGRAM

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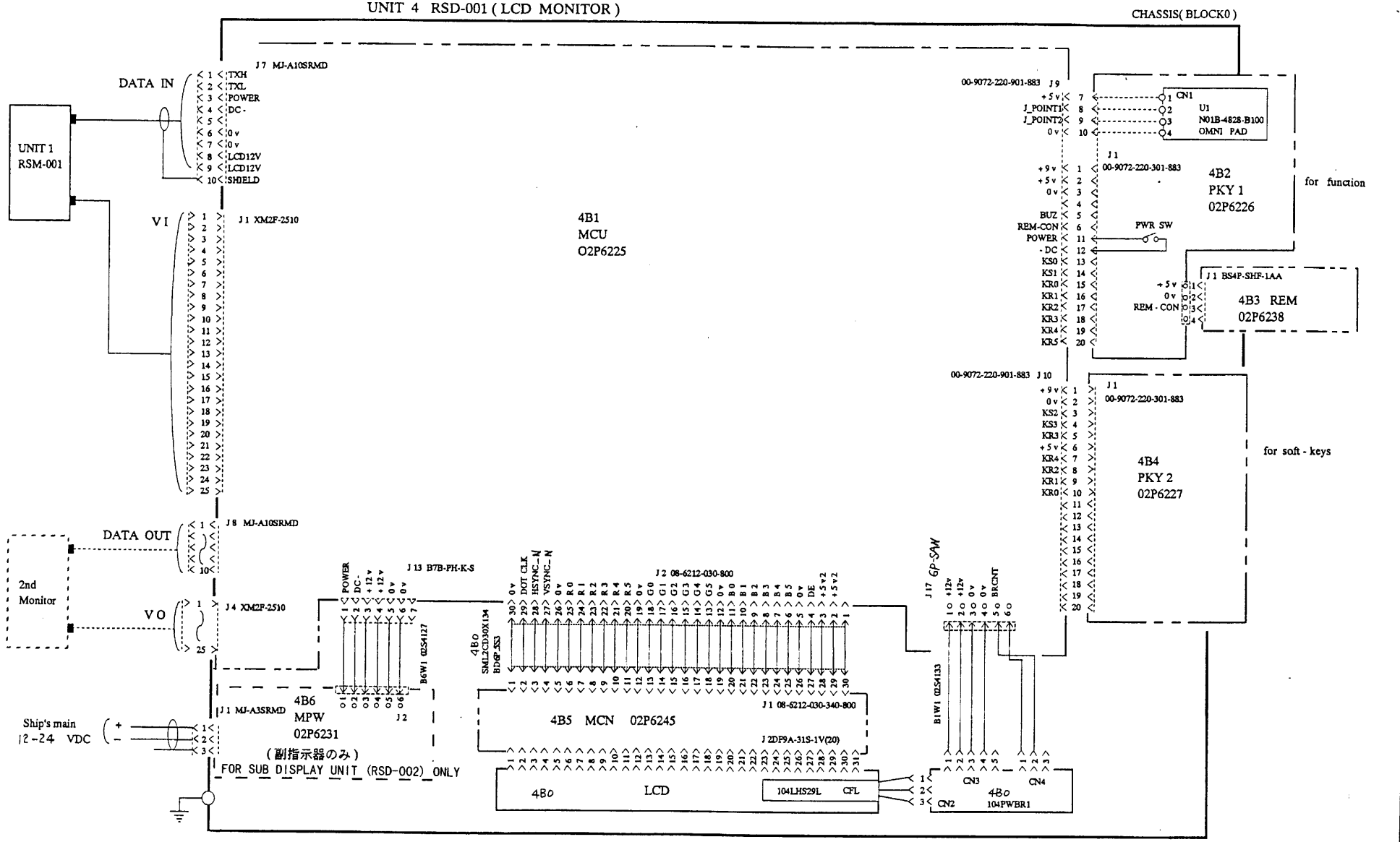
FURUNO

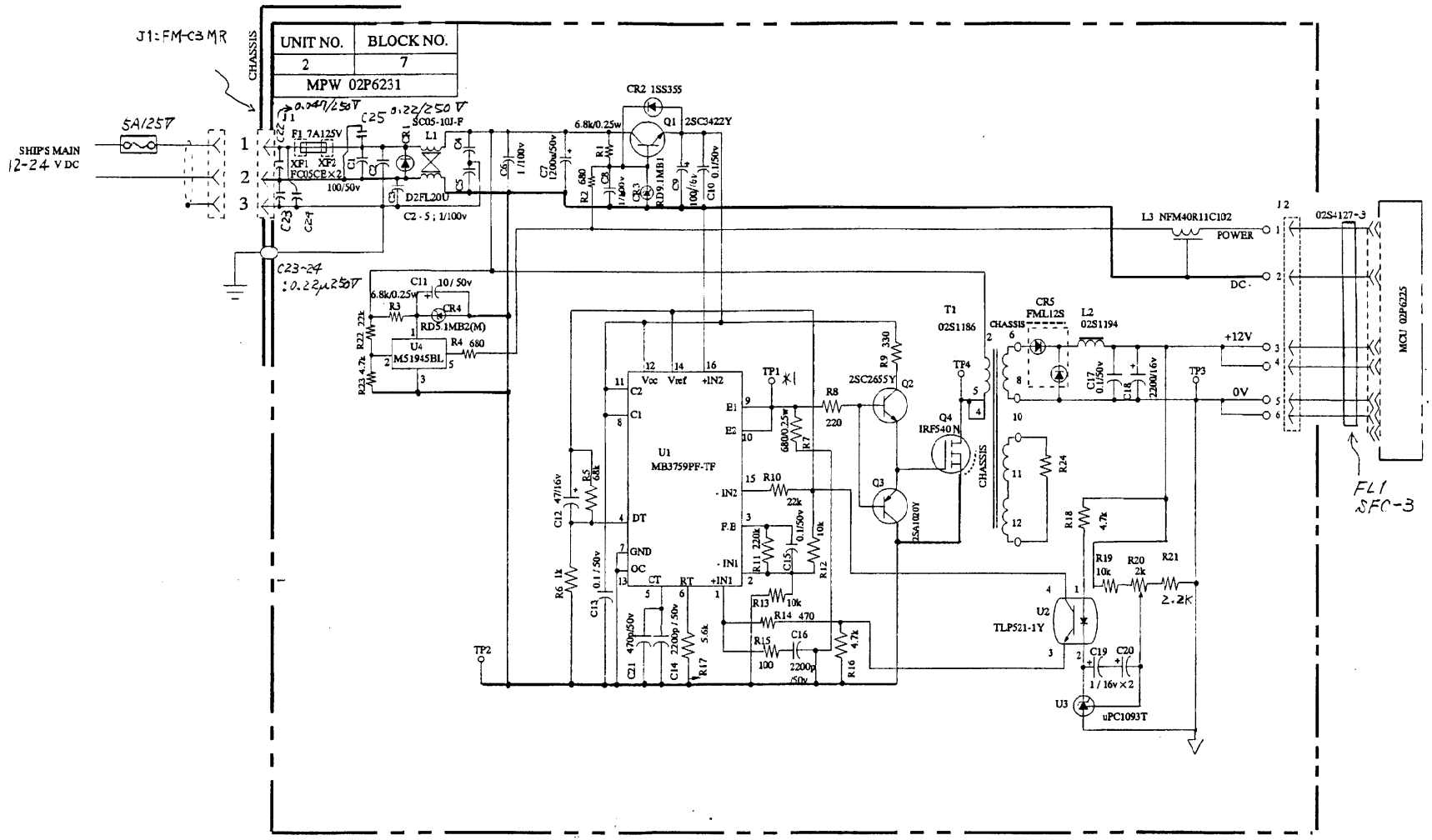
UNIT 4 RSD-001 (LCD MONITOR)



DRAWN Nov.10'98 T.YAMASAKI			TYPE RSD-001/002
CHECKED Nov.20'98 K.Kusunoki			名称 指示器／副指示器
APPROVED Nov.20'98 K.Kusunoki	FRS-1000 RS-1000		回路図
SCALE / MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME DISPAY UNIT/SUB DISPLAY UNIT
DWG NO. C3446-K01- B	86-012-5100- 0		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO



DRAWN Mar 15 '99 E. Kishimoto	FRS1000C		TYPE 02P6231
CHECKED Mar 15 '99 K. Ohashi	FRS1000B		名称 電源基板
APPROVED Mar 15 '99 Kayoshi	FRS1000A		
SCALE / MASS kg	RS1000C	7B 2	回路図
	RS1000A		NAME MPW PCB
DWG NO. C3446-K02- D	APPLICABLE TO: (MODEL) 86-012-5105- 7	BLOCK NO.	SCHEMATIC DIAGRAM

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FURUNO

S - 7

B2W1:02S4112
B2W2:02S4113
B2W3:02S4122
B4W1:02S4117
B4W3:02S4118
B8W1:16S0142
B8W2:02S4114
B8W3:02S4111
B8W4:02S4116
B8W5:02S4120
B8W6:02S4115
B8W7:02S4123
B8W8:02S4119
B8W9:02S4148
B8W10:02S4124

GPS/DGPSantenna
GPA-018
(10m)
GPA-018S(20.30m)
OPTION
GPA-018S
(cable selectable)
GPS antenna
GPA016
TNC-BR-PC
20S0216 15m

PROCESSOR UNIT
RSM-001
B8J1
B8J10
B8W1
16S0142
1B5
GN-74
B5Jdata
B2W1
B2J1
7P-SAN
PSP
02P6223
1B7
GR-802
B7J2
B2W2
B7J1
B2J8
6P-SAN
XH2A-6042-A
B2J7
RCA
02P6229
B3J1
FURUNO/
NAVIO Card
B3J2
XH2B-6041-A
B3J3
Mini Card

Transducer
dual freq.:520-5PSD,520-5MSD
520-5PWD
B8J2
8m
FM-C10MR
B8J5
B8J12
B8W3 02S4111
5P-SCN
B2J2
B5B-XH-A
B8J13
B8W4 02S4116
5P-SAN
B2J3
B5B-PH-K-S

Transducer
50/200/-1T
or
200kHz(200B-xx)
50kHz(50B-xx)
MB-1000

B8J14
B8W5 02S4120
7P-SAN
B2J5
B7B-PH-K-S

STsensor
ST-02MSB
T-02MSB
speed/temp
FM-C6MR
8m
B8J4
02S4148
B10J2
S-10B-XH-A
B10J1
B2J6
XH2A-2041-A
B2J4
B9B-XH-A
B4W1
02S4117
B4J2
9P-SCN
RPW
02P6224
B4J6
B3B-PH-K-S

LCD
Monitor Unit
RSD-001
1st
Monitor
RSD-001
10.4LCD
02S5112
MCU
02P6225
NMEA0183I/O
NMEA0180
FM-C6MR
10m
B8J8
B10J2
S-12B-XH-A
02S4149
PCN
02P6265
DATA IN
FM-C10FPD001-050,100,150,200,300
FM-C10MR
B8J9
B2J9
15P-SAN
VI
02S4146 5,10,15,20,30
B8J15
B8W10 02S4124
13P-SAN
B8W10
B4J3
B13B-PH-K-S
B2W3
B1J4
B15B-PH-K-S
B4J4
B4J1
B4J5
B2B-PH-K-S
10P-SCN
B5P-VH
DATA OUT
AD-100
I/Flux-GatePG-1000
B8J16
B8W6 02S4115
5P-SAN
B1J3
B6B-PH-K-S
VO
Radar antenna
M1932MK2,M1942MK2
Radar antenna
M1832
B8J17
B8W7 02S4123
14P-SAN
B1J5
B14B-PH-K-S
B1J2
B10B-XH-A
B4W3
02S4118
FM-C6MR
B8J7
03S9386 10,15,20,30m
MJ-B24LPF0005-xxx
RCN1
02P6228
MJ-B24SRMD
(RDR)
02P6222
B1J107
HIF6A-68DA-1.27DSA
1B6
(ARPA)
18P9007
B0W1
fan motor
+12Vtype
B0B1
MF-40B-12H

rem-con
RMC-010
14S4497-0

<PowerCable with fuse>
03S9368
12-24V DC
15A
5m
B8J6
MJ-A3SRMDZ1
B8J18
5P-SDN
B8W8 02S4119

100/110/200/220V AC
RU1746B
VO
XM2F-2510
RCN2
02P6266
B11J3
B11J1
S-10B-XH-A
B11J2
S-12B-XH-A

LCD
Monitor Unit
RSD-001
2nd
Monitor
MPW
02P6231
DATA IN
DATA OUT
VI
VO
rem-con
RMC-010
14S4497-0
5A
12 -24V DC
next monitor

CHASSIS(BLOCK0)

DRAWN Mar.15'99 E.Kishi	FRS1000C		TYPE RSM001
CHECKED Mar.15'99 K.Ohama	FRS1000B FRS1000A		名称 信号処理部 総合
APPROVED Mar.15'99 K.Nakanishi	RS-1000C RS-1000A		回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME SIGNAL PROCESSOR (GENERAL)
DWG NO. C3446-K03- C	86-012-5000- 2		SCHEMATIC DIAGRAM

FURUNO

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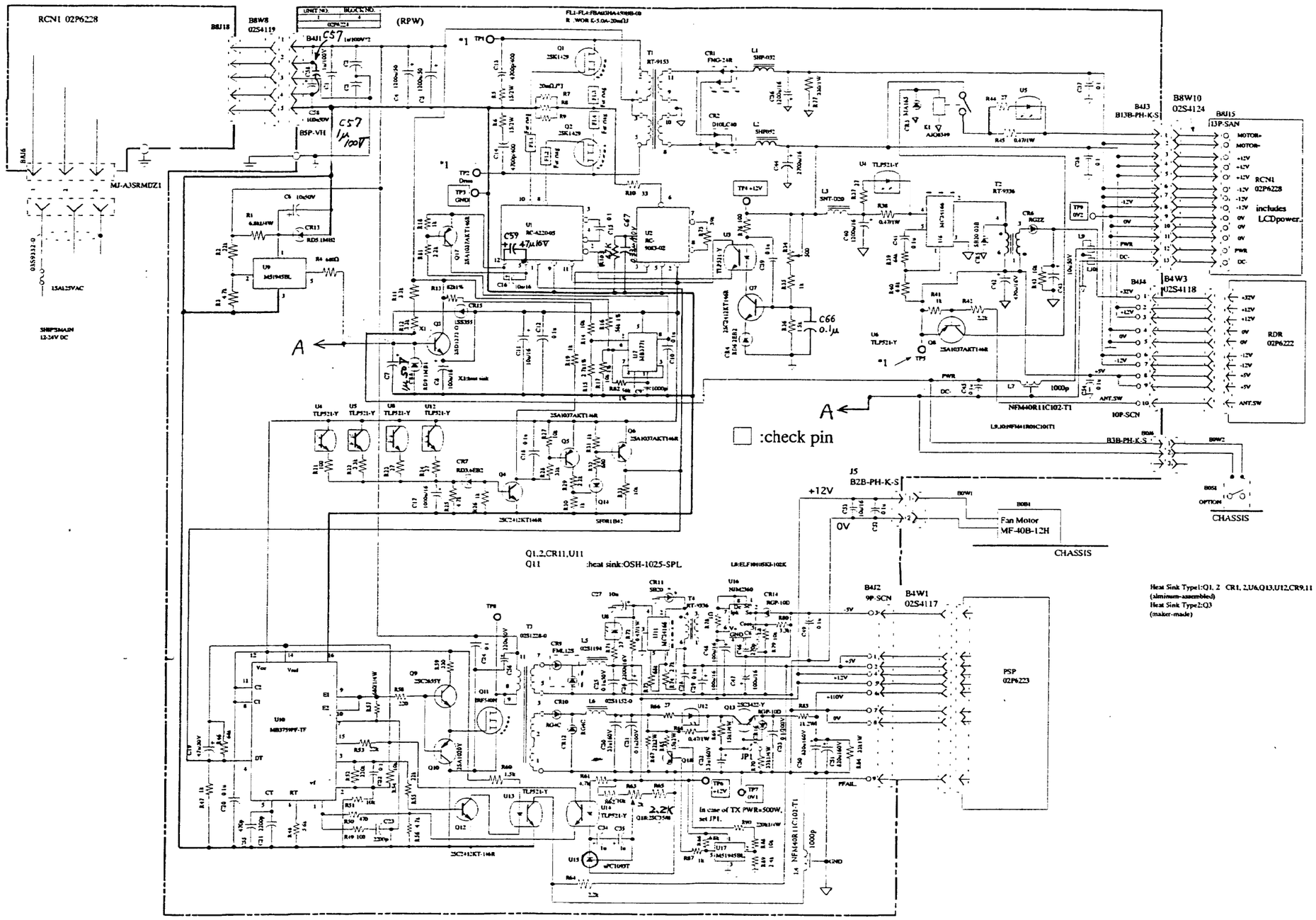

*1:no check pin

DRAWN Mar 15 '99 E. Kuriwa	FRS1000C		TYPE 02P6224
CHECKED Mar 15 '99 K Okamoto	FRS1000B FRS1000A		名称 信号処理部電源
APPROVED Mar 15 '99 Kiyoshi Ishii	RS1000C RS1000A		回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME POWER PCB
DWG NO. C3446-K04- D	86-012-5016- 9		SCHEMATIC DIAGRAM

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